The Chemical Age

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Notes and Comments

Crushing the Small Minority

LORD MELCHETT, a director and son of the first chairman of Imperial Chemical Industries, Ltd., introduced his Industrial Reorganisation (Enabling) Bill in the House of Lords on November 22, and it was read a first time. The Bill is to apply to fifteen of the principal industries, including the chemical industry, iron and steel, non-ferrous metals, textiles, glass and clay products, rubber and asbestos, paper, oils and fats, and foodstuffs. It is especially noted that agriculture, electricity and coal have not been included in the provisions of the Bill, as these industries have been provided for by existing legislation. The object of the Bill is to provide for the self-government of industries by enabling the majority of producers in an industry, notwithstanding the opposition of a small minority, to introduce and cause to be enforced schemes for the reorganisation of the whole or part of that industry with the general object of promoting greater efficiency, eliminating wasteful competition, and of facilitating the production, manufacture, and supply of the products of that industry.

Before any such scheme becomes effective it is to be subjected to the proper inquiry by a specially appointed National Industrial Council for the purpose of acertaining that it is in the public interest; that it relates to an industry or part of an industry which is fit for independent reorganisation; that it provides for adequate consultation with interested persons or bodies of persons; that it can be carried into effect without detriment to other industries and that it provides adequately for the future expansion of the industry to which it relates; and in addition it must receive the support of a three-quarters vote of the persons voting at a poll of the industry to which the scheme relates.

Procedure Under the Bill

ANY person or association of persons having an ownership interest in an industry may submit a scheme to the Board of Trade, and if in the opinion of the Board of Trade the interest of those putting forward the scheme is a substantial one, it is to be submitted to a national industrial council. The council is to consider the scheme and any objection and representations in relation to it, and will then present a draft order to the Minister. The draft report must express the council's opinion as to whether the application of such scheme to the industry to which the scheme relates is in the public interest; the industry to which the scheme relates is a fit one for independent reorganisation; the scheme provides for adequate consultation with persons having a special interest in the industry to which the scheme relates; the scheme can be carried out without detriment to other industries; and the scheme contains proper provisions and safeguards for the future development or expansion of the industry to which the scheme relates.

The draft report is to be published and in certain cases an inquiry is to be held after representations have been received. Two months after the publication of the draft report, or as soon as may be after the holding of the inquiry, the council must prepare a final report and submit it to the Minister, and if the report recommends that the scheme should be proceeded with it must be accompanied by a supplementary report as to the best means of taking a poll of all persons having an ownership interest in the industry to which the scheme relates on the question as to whether such scheme or amended scheme shall be made the subject of an Order of the Board of Trade, compiling a register of all persons having an ownership interest in such industry, and determining the allocation of votes to all persons having an ownership interest, provided that in considering such allocation the council shall have regard to the number of persons employed in and the capital invested in and the quantity and value of the output of such part of the business of such person as is engaged in the production or manufacture of the products of the industry to which the scheme relates.

Seventy-Five per cent. Majority

SCHEMES will only be imposed when a poll reveals a majority in favour of three-quarters or more of the votes recorded. If the result of the poll is to the effect that the number of votes recorded in favour of the scheme is less than three-quarters of the total number of votes recorded in the poll, the Board of Trade will report the result to Parliament and take no further action in respect of the scheme unless directed so to do by Parliament. If the result of such poll is to the effect that the number of votes recorded in favour of the scheme is three-quarters or more of the total number of votes recorded in the pool, the Board of Trade shall proceed forthwith to embody the terms of such scheme in a draft order to be laid before Parliament. The draft order must include provisions for the administration of the scheme, for the protection of minorities, for protecting the exploitation of new patents and processes

and for the investigation of complaints. The Order will come into force unless Parliament decides otherwise.

The Bill provides for a constitution of a national industrial council consisting of a chairman and not less than five, or more than twelve, other members to be appointed by the Board of Trade (not being Members of Parliament). It makes provision for the publication of the original scheme, the draft report, the final report and the register, and contains provisions for the amendment or extension of schemes.

The British Association of Chemists

THE British Association of Chemists, whose seventeenth annual meeting was held in London last Saturday, has distinguished itself by its progressive membership in years when the Chemical Society, the Institute of Chemistry and the Society of Chemical Industry have felt themselves fortunate if they have managed to maintain their membership. The total membership of the British Association of Chemists is now 1,718; 177 new members have been elected during the year, in comparison with 189 in the preceding year. Several members have entered professions outside chemistry, which accounts for 39 resignations, and it is with regret that the council records the death of ten members, while two names have been removed from the register in accordance with the rules. There is a net increase of 112 members, compared with a net increase of 89 in the previous year. The financial statements presented at the meeting show the expansion of the Association's activities. Donations have been given generously to forward the work and the special aid fund has been in a better position to give valuable and timely assistance in several cases of urgency.

It is especially satisfactory to notice that the calls upon the unemployment benefit fund have not been so heavy as in the previous two years, the total disbursements being less than half the total for 1932, and about 30 per cent. below the payments for 1933. Claims have generally been of short duration, many members having benefited from registration with the appointments bureau. There has been an encouraging increase in the number of employers sending inquiries direct to the Association. The appointments notified have generally carried substantial salaries. It is the view of the council that the employer is fully alive to the fact that the competent chemist is entitled to, and expects, a fair salary, and an applicant asking for a salary below the appropriate figure is generally ignored on the ground that he lacks confidence in his ability to do the work. When approached by the Ministry of Labour in connection with the issue of permits for alien chemists, the Association was able, in every instance, to submit applications from members qualified to carry out the duties specified.

A Step Towards Federation

DESPITE its unique record of service to the chemist, the British Association of Chemists has not yet been asked to join in the movement which has been occupying the attention of the three chartered institutions—the Chemical Society, the Institute of Chemistry and the Society of Chemical Industry—for some years with the object of bringing about an amalgamation or federation of chemists in a single association which could speak with a united voice on matters of material interest to the chemist. The three senior bodies have moved exceedingly leisurely, and according to what Professor G. T. Morgan told the British Association of Chemists at its annual dinner, the scheme so far agreed to by the " big three " represents a very short step in the direction of federation. The idea is to pool the resources of the three bodies and to effect economies in publications and in administration. We do not agree with Professor Morgan that the British Association of Chemists should enter the arena as a gate crasher. Any unification which ignores a body of nearly 2,000 chemists, constantly growing, both in numbers and influence, and with such a record as the British Association of Chemists was able to submit to its members last Saturday, is bound to fall short of its ultimate aims, and we believe the Association will do well to carry on independently until the older organisations see fit to approach it with an invitation to participate in a movement which undoubtedly has much to commend it. There are great possibilities in some measure of co-operation, but we are not at all sure that the sort of linking up at present contemplated in some quarters would benefit anybody.

It is of interest to observe that the British Association of Chemists, at its annual meeting, passed a resolution urging members " to take active personal interest in any scheme for co-ordination and improvement of the existing chemical journals," on the ground that better and less expensive publications will assist the progress of British chemistry. It is desirable to be quite explicit about this publication business, and to draw a clear distinction between the technical Press and the "journals" or "transactions" of the various organisations. There is an enormous mass of technical information which can never see the light of the technical Press but which, if placed on record in a co-ordinated and unified book of " transactions," would probably be of permanent benefit to the members. At the same time there must be no irksome restriction upon the extent to which the technical Press may assist the amalgamated organisations by publishing accounts of their activities. No existing association is more appreciative of widespread publicity than is the British Association of Chemists, and we cannot help feeling that this is one of the principal secrets of its success.

Ramsay Memorial Fellowships

Awards for 1934-35

THE Ramsay Memorial Fellowship Trustees have made the following awards of new Fellowships for the year 1934-35 :—Mr. G. C. Hampson, a British Fellowship of £300, tenable for two years, at the University of Oxford; Mr. George Bryce, a Glasgow Fellowship of £300, tenable for two years, at the University of Cambridge; Monsieur Berton, a French Fellowship, at the Imperial College of Science and Technology, London; Dr. Charles Haenny, a Swiss Fellowship of £300, at Birkbeck College, London; Professor G. Semerano, an Italian Fellowship of £300, at the Imperial College of Science and Technology, London; Dr. M. G. van ter Horst, a Netherland Fellowship of £300, at the University of Cambridge.

The Trustees have renewed the following Fellowships for the same year :—Dr. C. Kawassiades (Greek Fellow), Ramsay Memorial Laboratory of Chemical Engineering, University College, London; Dr. Ikutaro Sawai (Japanese Fellow), University College, London; Dr. A. G. Winn (British Fellow), University College, London.

The British Association of Chemists

Seventeenth Annual General Meeting and Dinner

THE seventeenth annual general meeting of the British Association of Chemists was held at the Waldorf Hotel, London, on November 24, and was followed by the annual dinner and dance. There was a large attendance at the meeting and the largest attendance yet recorded at the dinner and dance. Professor E. C. C. Baly, president, first made reference to the death of Sir Max Muspratt who, he said, was closely interested in the work of the Association both directly and indirectly. On behalf of the Association he had expressed to Lady Muspratt how much the death of her husband was regretted by the members, in common with the members of so many other organisations.

Mr. W. H. WOODCOCK, hon. treasurer, presented the accounts and commented with satisfaction on the general state of the finances. The balance was small but the Association did not exist to accumulate large balances, the object being to spend their funds in the best interests of the members. Referring to the unemployment benefit fund, the treasurer commented on the fact that during the second six months of the year the amounts the fund had been called upon to pay to members out of employment had fallen considerably as compared with the first six months, and that was positive evidence of the improvement in trade. Finally, in view of the possibility of considerable expense of a general character during the coming year he urged the necessity for securing more members.

Net Increase of 112 Members

Mr. S. REGINALD PRICE, chairman of council, presented the annual report. Although there had been an increase in the membership during the year of 112, which indicated progress, in his view the rate of progress was not nearly rapid enough having regard to the progressive work which the Association was doing. Speaking of the unemployment benefit fund he commented on the enormous advantage of this in assisting an unemployed member to retain his self-respect whilst he was seeking a new post, and at the same time supplemented what the hon. treasurer had said as to the signs of improving trade in that the demands for unemployment benefit had so largely decreased during the latter six months of the year. That fund was linked up with the appointments bureau which was being made increasing use of by employers, and he felt that the extended use of that bureau, with its knowledge of what the applicant was capable of, would do more to help in assisting in the filling of appointments than any amount of argument on the part of the individual applying for a post. For that reason alone, therefore, it was hoped that the appointments bureau would be used to an increasing extent by firms requiring new members of their staffs, in the form of trained chemists. Emphasis was also laid on the value of the legal aid which the Association was able to afford its members and Mr. Price expressed thanks to the able assistance that had been received from the Association's legal advisers, especially in the matter of appointment agreements.

Mr. A. HILL, who seconded the adoption of the council's report, said he would not be satisfied until the Association included in its membership 80 to 90 per cent. of the chemists of the country, because then the further increase of membership would go "like a house on fire."

Unemployment Fund

Mr. J. BRISTOWE P. HARRISON, chairman of the unemployment special purposes committee, presented the report of that committee and put forward a number of suggestions for extending its work by way of giving increased benefits in certain circumstances.

It was decided that the proposals as set out in the report should be discussed by the local sections and a decision come to in accordance with the number of votes recorded for the alternative suggestions. There will be an annual general meeting of the local sections in six months' time and the matter is to be dealt with then. In reply to the criticism that this would delay matters for six months, Miss Wright—who has been responsible to some extent in this matter—said there was no hurry, because at the moment there were not the funds available to give full effect to all that was proposed.

The election of officers resulted as follows:—President, Professor E. C. Baly, F.R.S.; vice-presidents, Wm. E. Kay, C. S. Garland, J. Bristowe P. Harrison, Professor I. M. Heilbron, F.R.S., Professor A. G. Green, F.R.S., Sir James Colquhoun Irvine, F.R.S.; hon. registrar, E. H. Hood; hon. treasurer, W. H. Woodcock; hon. editor, H. T. F. Rhodes.

A resolution was moved on behalf of the London section relating to the representation of the local sections on the council, but after a brief discussion the matter was referred to the council for consideration, with instructions to bring forward a scheme which will give something approaching to proportional representation of the local sections on the council of the Association.

Co-ordination of Journals

Mr. H. W. ROWELL (Birmingham) moved the following resolution: "As better and less expensive publications will assist the progress of British chemistry, this Association urges its members to take active personal interest in any scheme for co-ordination and improvement of the existing chemical journals." Mr. Rowell, who explained that he referred to the Chemical Society and the Society of Chemical Industry, said there was no catch in the resolution and it meant exactly what it said. All the members of the Association were chemists who had to rely largely on the published literature for personal progress in the profession and it was therefore their business to interest themselves in the quality and price of the tools of their trade. Practically all the members were also members of the societies mentioned, or of one of the specialist technical societies which were off-shoots of the two principal societies, and what the resolution asked was that some active steps should be taken in hastening the improvement of their publications. The question was, of course, what active interest could be taken? The position was that the councils of the Chemical Society, the Society of Chemical Industry and the Institute of Chemistry had discussed and held joint meetings for the past two years but had got no farther than the idea that someone ought to do something about it, but nothing had been done. It had been found impossible to realise Professor Pope's ideal of a group of chemists, meeting as chemists, and seeking the good of British chemistry, and not as guardians of the prerogatives of their pet society. The officers and councillors of these societies were the keenest of the elder members who had spent considerable time and energy in developing their societies. They had guided their charges through difficult times and were probably the world's most expert economisers. Chemists owed them a great deal for carrying the burden, but economy had been carried to the limit and if it was desired to replace the policy of economy by a policy of enterprise more suitable to the present position, then the councils of the various societies must be told so in no uncertain voice. Having no mandate from their members they naturally adopted a solidly conservative policy.

The Poisons Bill

A short discussion followed the moving of this resolution which was seconded and eventually carried. During the discussion reference was made to the difficulties which have been experienced in bringing about a complete scheme of co-operation between the Chemical Society, the Society of Chemical Industry and the Institute of Chemistry, and comment was made on the position that has arisen in connection with the Poisons Bill, now before Parliament, in which the name of the Institute of Chemistry appears in the schedule.

The PRESIDENT, acknowledging a vote of thanks to the retiring officers, referred with satisfaction to the manner in which

the unemployed special purposes committee had weathered the storm of the depression during the past few years. Another feature, he said, was the institution of the new honorary Fellowship. The council had decided that this honour should be restricted to a very few of the distinguished members of the profession, and so far two such gentlemen had accepted the Fellowship, namely, Sir Robert Mond, a distinguished scientist, and Mr. C. T. J. Cronshaw, who was on the industrial side. It was also a matter for considerable gratification that Sir James Irvine had accepted the office of vice-president. Speaking with regard to the Poisons Bill the president said the Association had made application for its name to be placed in the schedule to the Bill and more than that it was not possible to say at the moment.

Mr. S. REGINALD PRICE, chairman of council, proposed a vote of thanks to Mr. Woodley, secretary, and the office staff for the manner in which they had carried out their duties during the past year. This was supported by the president and carried with acclamation.

The Annual Dinner

Professor E. C. C. Baly again presided at the dinner, when the principal guests included Sir Robert Robertson, F.R.S. (Government Chemist); Professor F. G. Donnan, F.R.S.; Mr. J. Davidson Pratt (general manager and secretary of the Association of British Chemical Manufacturers); Mr. E. R. Bolton; Dr. E. F. Armstrong, F.R.S.; Professor G. T. Morgan, F.R.S.; Dr. G. Senter (principal, Birkbeck College); and Mr. J. Keall (president of the Pharmaceutical Society).

Mr. C. S. GARLAND proposed the toast of "The British Association of Chemists and the London Section" in a humorous speech in which he said that Professor Green had calculated that if a lady "made up" her face twice a day, namely, 730 times a year, she used more paint in three years than was used on a house which was painted inside and out, and he concluded with the following:—

> He kissed her on her ruby lips,
> It was a harmless frolic;
> Although he kissed her only once,
> He died—of painter's colic.

Speaking seriously, Mr. Garland spoke of the valuable work which the Association was doing and in wishing it continued success in the future coupled the toast with the name of Dr. Armstrong.

Dr. E. F. ARMSTRONG, F.R.S., speaking of what the Association stands for, said that above all else it stood for that good old English institution, freedom, and because it did so it had been successful. He had recently been drawn involuntarily into a discussion as to whether at the present time the moral character of our young men and young women was being neglected and that as a result we, as a nation, were becoming decadent. He had ventured to disagree with that view because the work which was done by bodies such as the British Association of Chemists, through such men as Professor Baly, Mr. Garland, Mr. Price, Miss Wright, and heaps of others, an unselfish work for their fellow men was as fine an example of the right moral spirit as any form of the older religious expression. He valued the Association because of the unselfish work it did in striving to uphold the profession. From that point of view there was no body among chemists in England which was more to the fore and he respected it for that reason.

The Guests

Mr. S. REGINALD PRICE proposed "The Guests," many of whom he mentioned by name, and welcomed them all sincerely, at the same time expressing regret that the occasion was not one on which he could take up time, saying what the Association wanted to do, what it would like to do and what it could not do. Among those who had intended to be present at the dinner but had been prevented for various reasons were Dr. Levinstein, Mr. Cronshaw (I.C.I., Manchester), Major Freeth, Mr. Rintoul (I.C.I.), Sir George Clayton, Professor Thorpe, Mr. Pilcher (Institute of Chemistry), and Sir William Pope.

Professor F. G. DONNAN humorously replied and suggested that the reason why he was not a member of the Association was that for the fee of two guineas he could belong to half a dozen London night clubs. Speaking more seriously, he said that he was a member of a number of societies but was actually cutting them down. At the same time he had a very high appreciation of the work which the Association was doing and he expressed the hope that it would not be thought he was not a member because he did not appreciate that work.

The PRESIDENT said that although Professor Donnan had expressed his appreciation of the work being done by the Association he was inclined to doubt whether Professor Donnan really knew the value of that work, because if he did it was to be doubted whether a subscription of two guineas would prevent him becoming a member. The Association felt that it had undertaken a job, namely, that of benefiting their fellow men and the success of that work hitherto was to be seen in the manner in which the unemployment benefit fund had weathered the storm of depression for the past year or two. There had not been a single case which had not been helped to the fullest extent from the beginning, but it was a matter of great gratification to find the revival in trade that was obviously now taking place. Any Association like this which started in a small way must necessarily run risks for the first few years, but the unemployment fund was now in a fairly strong position and he was more than proud to be able to say that there was not a single case which had not been met as far as it was possible to do so. Comparisons had been made between the British Association of Chemists and the Institute of Chemistry, but the difference was perfectly obvious. The Association made no claim to be a qualifying body at all. The claim it made was that it took charge, as far as lay within its power, of the material life of the members. There was the matter of unemployment and, probably not less important, the work that was done in assisting the members in the matter of interpretation of agreements for employment and matters concerned with dismissal in a manner which was contrary to the terms of agreement.

Such men as Professor Donnan would be heartily welcomed as members, not because of the two-guinea subscription but because of the value to the work of the Association in having their names associated with it and in sympathy with its work. He had asked Sir Robert Robertson if he would help by joining, but it appeared there were special reasons why he could not, but he seriously appealed to others not so placed and who were free to join because if it was seen that the work inside the Association was appreciated by eminent men in the profession it would be an enormous help. That was the main reason why the council had instituted the Fellowship. It was not asked, however, that such people should commit themselves in any way to the principles of trade unionism, but to allow their names to be associated with the Association in support of what was being done to improve the status and the conditions of the trained chemist.

Movement Towards Federation

Professor G. T. MORGAN, F.R.S., proposing a vote of thanks to the President for his work during the past two years, said that whereas when he himself was president of the Association some years ago the membership was 1,100 it had now risen to over 1,700 and the Association was going from strength to strength. Societies like the Chemical Society, the Institute of Chemistry and the Society of Chemical Industry felt themselves fortunate if they managed to maintain their membership. In fact, during the last few years in the case of two of these bodies the membership had diminished. At the same time, success carried with it certain responsibilities. A great deal had been heard about what the Association could do and what it hoped to do, but at the present time there was a movement in which the three chartered societies were taking part with the object of bringing about an amalgamation or federation of chemists which would result in a much larger association of people who could speak with a united voice on matters of material interest to chemists. Great as the Association was, he believed it would do more important work if it joined in that movement. It was true, added Professor Morgan, that the Association had not yet been asked to join in that movement, but personally he felt the time had come when it should become a gate-crasher. The three chartered bodies moved leisurely. They had been two years producing a scheme and when it was made public it would represent a very short step in the direction of federation. The three bodies in question were coming together to pool their resources and to effect economies in publications and in administration.

At the Sign of the Cheshire Cat—VII

HH Monsterium Woollywestium—or Chemistry in Heavy Waters

DUE display has recently been made, within the purlieus of Burlington House, of the latest photographic records of the Loch Ness monster, which has so long excited public curiosity. The verdict of the discussion would seem to be: Very like a Seal! Maybe it has a hump but not several. Not to be outdone, chemists have brought their latest sensational catch, *Heavy Water,* to be blessed upon the nearby world-famous altar in Albemarle Street. The officiating priest, Professor Polanyi, came from foreign parts, from Hungary, via Berlin, a lately appointed dignitary of the Church of the University of Manchunium, who has been specially called to care for the souls of the Physical Chemical Acolytes of the said church. We use clerical language advisedly, as it is now generally admitted that our so-called science is ordered upon ecclesiastical lines, an estate of doctrinal shreds and dogmatic patches, no longer a mere vulgar search for truth by way of exact experiment and cautious deduction from established fact. Chemistry is being made an enchained, not an enchanted castle. In one of the latest bibles issued from the Oxford Press, we read of the interaction of gaseous hydrogen and oxygen, between 500° and 600°, that " it owes its peculiar characteristics to the fact that it is a chain reaction." The chains are made of imaginary fragments fashioned to the producer's taste. The statement is the equivalent of " In the beginning was the word." The word is both the beginning and the end, to-day: facts are of small account. It is only when we approach theoretical, physical chemistry from this point of view that we can understand "its peculiar characteristics." The explanation is that endowed research must be kept alive, just as is an endowed church, proclaiming outworn clerical doctrine: both have their following, because people will believe anything stated with apparent authority by appointed persons. The fear was that heavy water would be put in chains, in the lecture. Fortunately, it was not. There was no great rush for seats but chemists were present in unusual strength.

The Actors and the Play

Our Society reporter tells us that Professor Thorpe conspicuously filled a seat with ample distinction, being strikingly equilibrated by Professors Allmand and Desch's more restrained figures. The outlook of these three chemists upon water is probably very different, so they may be regarded as having been a good, all-round tasting committee. We know " The play's the thing." Still, the actor is of consequence. We were to witness a first performance by a player whose appearance upon our stage has excited no little comment. Cottonopolis held its head so high a year or two ago, so the rumour went, that no English-trained player of physical parts was good enough for its chemical stage: it therefore took the opportunity given by German persecution of Jewish intellectuals to secure the transfer from the Berlin stage of the actor who was to play " Heavy Water " to us. As is well known, calico printers have always hankered after foreign dyestuffs and have been slow, if not altogether wanting in will, to encourage local production. Perhaps, had it in the past considered its own interests a little more closely, it would not have been so awkwardly placed as it now is by far-eastern competition. A seat of one of the greatest colour-using industries, the original place of manufacturers of the azo-dyestuffs, Manchester, should be the chief school of technical chemistry in the country. Instead, it is unknown as such. The great success of the Textile Institute is proof that the higher science can be made of use and flourish there. It is time the place of chemistry were sufficiently considered. No amount of heavy water will save it. Our curiosity was to be satisfied at the performance in unexpected ways. As the curtain went up on the stroke of nine, we saw approach the rostrum a slim, dapper, well-groomed figure, who, with complete self-possession, without a trace of stage-fright, made the oracular statement: " One cubic centimetre of water weighs one gramme: one cubic centimetre of heavy water weighs one point one gramme—no millilitre nonsense—adding: " Now you know what heavy water is." Sufficient for the day was the evil thereof. The fact being stated with a high degree of concision, carried home by showing, on the screen, that a scrap of amber sank in water and floated upon the heavy article—little was left to be said and little more was said of " Its Heaviness." Beyond a few references to Professor Urey and Lewis, also little was said of the history of the subject. In fact, the play was a philosophical essay, no mere lecture—better suited perhaps to a class of advanced students. Discussion centred upon Deuthydrogen and the explanation of its properties as compared with those of hydrogen. More than was necessary, perhaps, was said of Professor Soddy's objection to calling it an isotope of hydrogen—isotopes, from his point of view, being little short of inseparables and, by his definition, inseparable by chemical means.

Philosophical Discussions

The question is—What are chemical means? Most substances are separated by reason of physical differences—by solvents, by distillation, etc. Homologous compounds are usually separated in this way. Only when differences of type come into play are chemical methods applicable. The fact is the word isotope is unnecessary; it has served its purpose. Isotopic elements are homologous, in every way comparable with the members of a series of homologous, normal paraffins. The play was mainly directed to a philosophical discussion in explanation of the peculiar relationship of the hydrogens, involving the application of a most delightful principle, very familiar to chemists, though rarely recognised by them, the principle of uncertainty. It appears that one uncertainty may be multiplied by another uncertainty to give a constant uncertainty. The book must be studied to appreciate the importance of this deduction. It is clear that it is applicable in particular to Royal Society chemistry and to chain reactions generally. Those who go about in chains, whether in Oxford or Cambridge, in Berlin, Brussels or Manchester, do nothing but invoke one uncertainty after another, ending up in smoke! Physical chemistry has been one glorious uncertainty since Arrhenius came and Ostwald engineered contorted explanations for all operations in solution. We shall have to thank heavy water for much, if the discovery but lead us back to the study of water as we have long known it. The differences between the two hydrogens and the two waters would seem to be merely that the heavier form is the more sluggish agent. They are of use in giving definite and final proof of a class of interaction not directly obvious. The hydrogen-oxygen gas battery is known to be a reversible engine: hydrogenation generally through the agency of metallic catalysts must be of this order.

A Nine Days' Wonder

When deuthydrogen is substituted for hydrogen, it displaces this to the point when equilibrium is established. Benzene exchanges hydrogen for deuthydrogen when shaken with heavy water and sulphuric acid. Every chemist who knows anything of the sulphonation operation, is aware that the acid and hydrocarbon combine reversibly, in the first instance, sulphonation taking place only when the necessary concentration limit is reached. Instead of being the greatest discovery of the age, both deuthydrogen and deuthydrone (HH_2O) are likely to prove little more than a nine days wonder in chemistry. Professor Polanyi seemed to have no illusions as to their value. He foresees that a water containing heavy oxygen (o = 18) would be of greater interest, as enabling certain delicate features in hydrolytic changes to be investigated. What the value of deuthydrogen, HH, may be to the physical school, no one can yet say: it may give clues to subatomic structure of the greatest value. If we so chose, all the known hydrogen compounds might in time have each atom of hydrogen displaced by deuthydrogen but to what end? When the operation has been carried out with a few

typical compounds, we shall probably be satisfied. At best, the work will be mere students' exercise work.

So much of the play: what of the player? Very soon, as we listened, some of us felt that we were in face of a great discovery: that an actor of surprising talent was playing to no gallery but fully aware that he was facing an intellectual house and acting accordingly. He was letter-perfect in his part; each sentence was most delicately phrased: fewer slips of idiom were to be noted than are to be found in Conrad's English. Every word was clearly and delicately enunciated, with utmost care and precision—so that all could hear. Although foreign in rhythm and intonation, at times, therefore a little difficult to follow, the voice departure from English usage was slight and should soon disappear with a little practice. The evening before we had the good fortune to hear Mr. Philip Guadella deliver an oration upon a deceased poet—in masterly English; he was notably clear and exceptional in his enunciation. So we had a control in mind. Had a Nobel prize for elocution been available, we should have divided it equally between the professor and the literary artist. It remains to be seen whether Manchester have the intelligence to work the lode of rich ore it has discovered. In our scientific circles, English is at its last gasp. The majority of scientific workers who appear at society meetings, members of councils and of committees, can only whisper—you might suppose that they were trying to tell you of some profound secret. Most of us seem to be incapable of forming our words, of separating our lips and speaking out. Reading aloud is not practised in the schools nor is there any teaching of rhetoric or of elocution; an example of correct speaking is no longer to be obtained from the stage or from any public platform. Physical chemistry at best is a poor subject *per se*. The English language does concern us. The Manchester authorities will do well at once to institute a highly paid chair of elocution and elevate Professor Polanyi to this post. They should insist, in the first instance, on their own professoriate attending the school. Other universities, finding the Manchunian so superior in his diction, will soon wish to establish travelling scholarships, so that their staffs may also seek instruction. Even the stage may be led to attend the school. Ample leisure should be allowed to the professor, so that he may attend Royal Society meetings and play the part of Public Orator to all but stalwarts like Lord Rutherford, Professor Soddy and Professor Bone, who can be trusted always to roar as gently as any hungry lion. Whether or no, however, Manchester prove wise in its generation, it has given us a lesson. The Royal Institution has had its literary triumphs before to-day: it has seldom done greater service than in bringing to the fore a foreigner to teach us, that the tongue that shakespeare spake is worth attention and cultivation and can still be used in public with scholarly effect.

Personal Notes

MRS. MINA L. KINGZETT, wife of Mr. C. T. Kingzett, F.C.S., died on November 22, in her sixty-second year.

SIR HARRY MCGOWAN delivered on Thursday the last of a series of addresses which have been given at the National Liberal Club on the organisation of industry. Sir Harry spoke on the organisation of manufacture.

MR. W. H. HODSON, one of the partners of Oliver Ashworth and Co., Radcliffe, Manchester, died in the Manchester Royal Infirmary on November 1. Mr. Hodson was thirty-two years of age, and had been ill for nineteen weeks.

MR. DAVID EVAN JONES, an inspector of factories at Liverpool, has been appointed Inspector of Factories for West Wales with headquarters at Carmarthen. Before his transfer to Liverpool Mr. Jones was at Swansea.

PROFESSOR HORACE LAMB, the doyen of the ex-presidents of the British Association, attained his eighty-fifth birthday on Tuesday. Professor Lamb was born at Stockport, and received his education at the Stockport Grammar School, Owens College, Manchester, and Trinity College, Cambridge, of which he was made a Fellow sixty-two years ago. Professor Lamb, was was president of the British Association in 1925, lives at Cambridge.

LORD EBBISHAM was the principal speaker at the anunal dinner of the National Federation of Associated Paint, Colour and Varnish Manufacturers, held in London on November 22. He made a strong plea for the preservation and beautifying of buildings by means of paint. Sir Kenneth Lee, of the Department of Scientific and Industrial Research, spoke at the same dinner on the necessity of research in industry.

LORD ELDON has been appointed deputy-chairman of Coal and Allied Industries, Ltd. (formerly Motor Fuel Proprietary, Ltd.), and Mr. H. P. Stephenson has been elected a director.

DR. R. E. SLADE, who has been chief of staff of the Billingham Works of the Imperial Chemical Industries, Ltd., since their inception 14 years ago, and latterly resident managing director, is resigning to take up the important position of chief of the whole of the research departments of the I.C.I.

MR. PHILLIPE BERTHELOT, former Secretary General of the French Ministry of Foreign Affairs, who has died in Paris, was a son of Marcellin Berthelot, the famous chemist.

PROFESSOR M. POLANYI has been compelled to postpone, until March 22, his lecture on "Catalysis," which he intended to deliver to the Manchester Section of the Society of Chemical Industry on December 7.

MR. WILLIAM W. GOSSAGE, of Wood Hatch, Munstead, Godalming, Surrey, formerly of Chetwode Priory, Buckingham, head of William Gossage and Sons, soap and chemical manufacturers, Widnes, who died on August 28 last, aged 72 years, left estate of the gross value of £245,434 (net personalty £236,313).

Coming Chemical Dinners

Joint Gathering at Liverpool

THE Liverpool and district members of the Chemical Society, the Institute of Chemistry, the Society of Chemical Industry and the British Association of Chemists, have arranged to hold a dinner at the Midland Adelphi Hotel, on Saturday, December 15. The Lord Mayor and the Lady Mayoress of Liverpool and the presidents of the four organisations are among the guests expected to be present. Applications for tickets for members and guests (12s. 6d. each, exclusive of wines) should be sent to Mr. J. S. Towers, c/o J. W. Towers and Co., Ltd., Widnes.

The London Annual Chemical Dinner

The Annual Chemical Dinner—open to all connected with chemistry—will be held in the Wharncliffe Rooms, Hotel Great Central, London, on Tuesday, December 18. Brig.-General Sir Harold Hartley, F.R.S., has consented to preside, and Sir Bernard Spilsbury will be the guest of the evening. It is suggested that every chemist should make a special point of attending this event, which provides an excellent opportunity for bringing members of the various chemical societies and institutions together. Tickets: 12s. 6d. each, for lady or gentleman, are obtainable until Tuesday, December 11, on application to the hon. organising secretary, Mr. F. A. Greene, Chemical Club, 2 Whitehall Court, London, S.W.1. Members of the following societies and institutions will participate: Chemical Society, Institute of Chemistry, Society of Chemical Industry, Society of Public Analysts, Faraday Society, Biochemical Society, Society of Dyers and Colourists, Ceramic Society, Institution of Chemical Engineers, Institution of Petroleum Technologists, Oil and Colour Chemists' Associa ion, Association of British Chemical Manufacturers, British Association of Chemists and Chemical Club.

The Development of the Spectrograph

By F. Stanley

THE earliest spectroscope of which we have any knowledge was constructed by Newton, who was the first to decompose white light by the prism. From the various experiments which he carried out, he concluded that white light was not homogeneous but formed of seven principal colours which he called primitive lights. Actually the spectrum which Newton formed was very impure owing to the imperfect apparatus at his disposal as shown by Fig. 1.

The continuous black lines in this diagram indicate the arrangement of elements used by Newton to decompose white light, while the broken lines indicate the only addition which has been made since. Light enters the system through the aperture A, and falls on the prism B which decomposes the

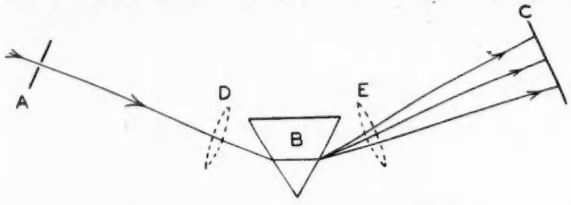

Fig. 1. Optical System of Spectroscope.

light into the spectral colours and they are seen on the screen C. If the aperture A is made sufficiently narrow so as to become a fine line of light, the spectral colours become purer and the seven "primitive lights" increase in number until the aperture is nearly closed. If the two lenses D and E are inserted in the light path the spectrum is well defined and the system then becomes the modern spectroscope found in all efficient laboratories.

In 1802 Wollaston detected dark lines in the spectrum of the sun, and later Fraunhofer studied and gave a detailed description of them; upon these lines the whole science of spectroscopy is based. If in place of the sunlight a monochromatic source such as the familiar sodium flame is used, there will no longer be a continuous coloured spectrum but a single image of the spectrum in one colour only. If instead of the sodium light a mercury lamp is employed, there will be a series of lines visible, *i.e.*, two yellow, one green and three violet, and the relative position of these is constant. So with other sources, each in turn gives its own series of lines, some of which are exceedingly complex, such as that when using the iron or tungsten arc.

It will be noticed that bright lines are mentioned in the case of artificial light sources, and black lines in the case of the sunlight. If any light source such as the flame or arc is surrounded by a vapour of the element giving rise to the lines but at a lower temperature than the source itself, the spectral lines are absorbed by the vapour and a black space or line results. The sun, being enveloped in such vapour or gas, produces a spectrum which consists of a large number of black lines superimposed on a continuous background.

The earlier experiments were all carried out with spectroscopes in which the lenses and prism were of glass, but it was soon discovered that the spectrum extended far beyond either the blue at one end or the red at the other. As the invisible blue rays could only be photographed, the spectroscope was adapted for photographic purposes and became known as the spectrograph, and is the instrument in more general use.

The next stage in the development of the instrument was the substitution of quartz for the glass previously employed, and, as this material is one of the most transparent known, the spectrum can be explored to the limits given by the source. Spectrographs with quartz elements are now constructed in a variety of forms to meet requirements of physicists and chemists and for astronomical purposes, but the fundamental arrangement of optical elements does not greatly vary. A modern spectrograph as made by Bellingham and Stanley, Ltd., is shown in Fig. 4. The optical system is the same as indicated in Fig. 1 and consists of a slit at the extreme left of the illustration, two lenses and a prism at the centre of the instrument and a darkslide which may be raised and lowered at the extreme right. The light source to be examined is situated in front of the slit and adjusted until the light passes through the slit prism and lenses to the darkslide. If an iron arc is used as a light source the spectrum will appear on the photographic plate as in Fig. 2A. Zinc in a similar way gives its characteristic spectrum, Fig. 2B, while the spectrum of copper appears as in Fig. 2C.

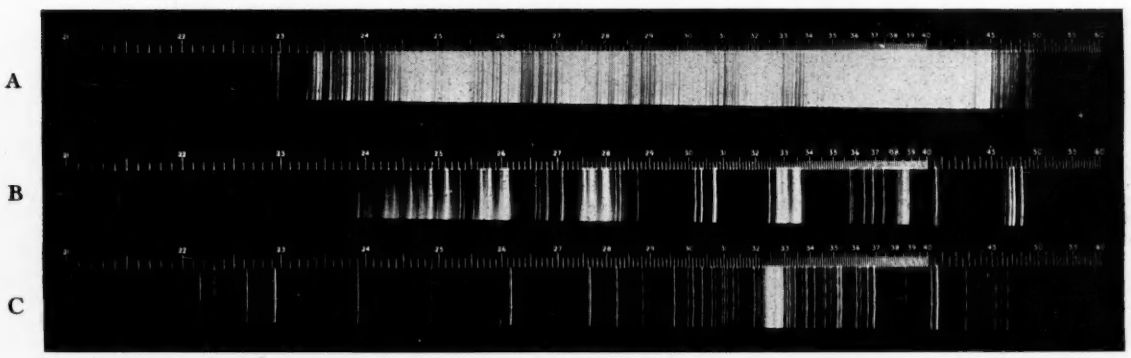

Fig. 2. Characteristic Spectra of Iron, Zinc and Copper Arcs.

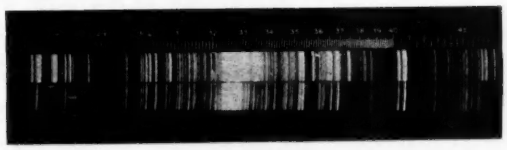

Fig. 3. A comparison of the Spectra of Brass and Copper.

These photographs clearly indicate the difference in the spectra of these elements, and under similar conditions will remain constant in the intensity and position of the lines. It is therefore obvious that when the general appearance of the different spectra of the elements are known, any element can be identified by the spectrum produced. In practical spectroscopic analysis it is seldom that only one element is present,

and it is necessary to identify the elements, in what may be a complex spectrum. In general, several elements may be expected, and these may be first determined by taking comparison spectra of the unknown against known elements as in Fig. 3, which is a comparison spectrum of brass and copper. In a similar manner the presence of zinc is determined. When the lines due to the major constituents of the substance have been found and identified, the remaining lines are due possibly to some impurity, and it is for the determination of such impurities present in probably exceedingly small amounts, that the spectrograph is generally applied, and for such work there is no other instrument available so sure and certain in its results.

Within the last few years research has shown that not only can the spectrograph be used for qualitative estimation, but under suitable conditions quantitative measurements are

Fig. 4. Bellingham and Stanley Spectrograph.

possible to a high degree of accuracy. It is impossible in a short article to give more than an outline of the methods used for qualitative spectroscopy.

If a number of alloys are made up each with a different known quality of some particular element, the spectrum lines due to this element will increase or decrease in intensity as the amount present varies. Several means are available for measuring the intensity of these lines in comparison with lines due to the major constituents, and from the results the relation between the line intensity and quantity present is determined. An accurate method of measuring the intensity of the spectrum lines is to employ a rotating sector in front of the spectrograph slit. The shape of the sector is such as to give a gradually increasing exposure to different parts of the slit. The resulting photograph gives the spectra of the alloy but the length of lines vary and a measurement of the length of line determines the intensity. When once the relative intensity of the lines has been determined for known quantities of the element in question, unknown samples of the same alloy can be investigated, and the reference photographs already available used as standards.

For instance, it was necessary to determine the amount of bismuth present in two samples of copper. A number of

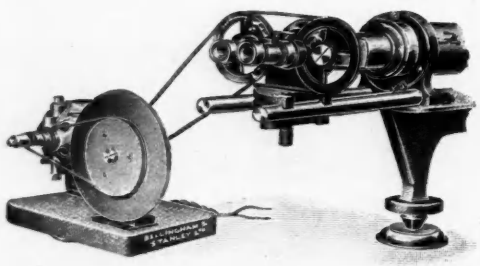

Fig. 5. Spectrograph equipped with Sector Photometer for Absorption Spectra.

samples of copper was prepared, each with a known amount of bismuth. The spectra of these were photographed and the relative intensity of a bismuth and copper line determined, using the rotating sector method and measuring the length of the lines. The samples were also examined by four independent chemists using ordinary chemical methods. The results were as follows :—

	% By Chemical Methods.				% By Spectroscopic Methods.
(*a*)	0.0045	0.0050	0.0065	0.0068	0.0070
	mean 0.0057				
(*b*)	0.0050	0.0072	0.0077	0.0090	0.0072
	mean 0.0072				

These figures show conclusively the reliance which can be placed in the spectrograph when sufficient care is taken in the test.

The spectrograph has many other important uses, particularly for the study of absorption spectra. When light passes through certain substances definite rays of light are absorbed, and when the spectrum is examined it is found that certain rays are missing. Absorption spectra have been studied from the time of Brewster, who first examined various coloured solutions and certain gases, and now that accurate methods are available for measuring absorption spectra in the ultra violet, particularly by means of the sector photometer, a very large amount of important investigations is being carried out. The work which has already been done is sufficient to show that the study of absorption spectra will add greatly to our knowledge of chemical structure. Nearly all important work on absorption spectra, and particularly the routine control for vitamin concentration, is carried out by means of a sector photometer, used as a separate instrument in front of the spectrograph, or attached directly to the spectrograph so as to form one complete unit as shown in Fig. 5.

Coal Carbonisation

Methods for the Distinction of Various Coals

An interesting lecture on coal carbonisation was given at King's College, London, by Dr. Sinnatt, M.I.Chem.E., F.I.C., Director of Fuel Research, Department of Scientific and Industrial Research.

Dr. Sinnatt gave an outline of the application of science to the distinction of kinds of coal for the determination of the commercial value of a seam. The characteristic properties most used were those of volatility and the "swelling power," together with the associated spores which were identified under a microscope. The method adopted to determine "swelling power" was to compare the volume of a given sample of finely powdered coal before and after heating for a certain period and temperature in a closed tube. The particles of coal when heated were found to become transparent when they were examined under the microscope. The structure of the particles was identical with the bubbles of the froth of paraffin wax.

Undoubtedly the most important method of identification, said Dr. Sinnatt, was by means of the spores found with the coal. This method was one which was being improved at the moment. X-rays were also used, and were found of great assistance, especially in the identification of inorganic matter and the smallness of the coal resulting from breaking up a particular sample. This latter, an important commercial aspect, was seen by transparent lines indicating a weakness in the structure and therefore a likely point for fracturing to occur. Spectroscopic analysis, as suggested by Goldsmidt, was also used to determine the elements present—a very valuable piece of information for coal which was to be used for the preparation of petroleum, since coal containing tin or germanium was easier to hydrogenate as these elements catalysed the process. Another method of coal identification was by the "float and sink" method by which the hydrogen content (also a very important piece of information for petroleum preparation) could be determined.

Dr. Sinnatt then discussed the structure of the coal molecule, which seemed to be benzenoid. This theory was supported by Professor Bone (who had prepared benzoic acid from coal by oxidation) and by Dr. Sinatt's work in the production of aromatic compounds by the hydrogenation of coal. The hydrogenation of coal was achieved by the careful regulation of the temperature and of the pressure of hydrogen. About 0.07 per cent. of stannous hydrate was used as a catalyst in the process by which 70 per cent. of the weight of coal used appeared as a colourless liquid which contained, however, a large proportion of highly unsaturated compounds. Dr Sinnatt finished by saying that this field of knowledge required early development and, whilst a plant was being erected in England for the preparation of 30,000,000 gallons of petrol per annum and in Germany a train was in the near future to be run on pulverised coal, these developments were due to the unaided efforts of the industry itself, for it received little support from the academical side of chemistry.

The Chemical Aspect of Food Standards

By L. H. Lampitt, D.Sc., F.I.C.

Food Standards and the Recent Report of the Departmental Committee on the Composition and Description of Foods were criticised by Dr. L. H. Lampitt, chief analytical chemist to J. Lyons and Co., Ltd., in a paper which he read at the Public Health Congress, London, on November 22.

My position is essentially that of a chemist in the food industry. It has been said that the points of view of chemists and of food manufacturing firms are as the poles apart when it comes to the question of standards. My own experience is that this is a gross exaggeration and a libel on the food manufacturer—you note I assume, in making this statement, that the chemist is right, that *he* is not the libelled party. I have, on previous occasions, spoken against the multiplication of laws and regulations; the more laws, the more offenders, with the consequent destruction of the spirit to do the right thing—a sad demoralisation. To do right "by numbers," to be drilled to do right, to observe the "Verboten," the "Keep Off" signs, does not develop true honesty. Bureaucracy calls for standards because bureaucracy lives by the making of rules and regulations, and therefore we may possibly discount, if not dismiss, any cries for control which might assail our ears from such quarters. There are, however, people with a perverse sense of smartness who delight in doing wrong, selling under weight, selling the second best and calling it the first. Not that they make a success of it in the long run, but they may during a spell cause harm and deceive their customers and they may also do harm to their competitors too.

In this connection it is not unimportant that many members of the legal profession are concerned at the increase in departmental control. At the last provincial meeting of the Law Society, Mr. McKeag (a solicitor and a Member of Parliament) read a paper dealing with this subject. According to newspaper reports he said: "There should be a substantial diminution in the output of legislation. There is too much of it. Let us curb the insensate desire to legislate about anything and everything. It is time we began to administer a corrective to the insatiable appetite to control other people's affairs."

Loopholes for the Unscrupulous

Were it not that it provides loopholes for the unscrupulous, I consider the Food and Drugs Act as now consolidated, to provide adequate safeguards to the public and sufficient to maintain a high standard of purity of food, but unfortunately the phrase "nature and substance or quality demanded" is difficult of interpretation if there is no standard of "nature" or of "substance."

Let it be assumed that standards be desirable. How are those, in whose hands the administration of the law lies, to judge or decide the agreement of any food with the respective standard? I can only see two ways: control of manufacture or control by scientific tests of the finished goods. It is obvious to any thinking person that manufacturers must object to the first method, not because they are afraid that such control by means of inspection would reveal malpractice, but because it is often the details of manufacture, the details of production, that make for success or failure.

Let me illustrate this point. A confection is being produced by firms A and B—the raw materials being simply x, y and z, in both cases. The firm A finds that by mixing x and y together and cooking in a certain way with the subsequent addition of z, it can produce a product identical with the product of B, who employ a more complicated or more time-consuming procedure *but* with halved labour costs and lowered steam consumption. A is thus enabled to make an increased profit, or sell at a lower rate. Is it likely that this firm will calmly welcome detailed inspection of their process? Or again, A may find that by a slight variation of the recognised method of production, the same raw ingredients, x, y and z, can be made to produce a more appetising confection than that produced by B. Can it be expected they will take kindly to inspection? After all, it is the *product* and not the *process* which must be submitted to standardisation. Therefore I am convinced that the fair method is to define the final composition of the food, and consequently any standards must be capable of accurate definition and their observance verifiable by scientific methods. It may be thought that I advocate this because the more chemical tests the more chemists employed. This is not my reason. It is my faith in chemistry which alone prompts me to give this as my opinion. There are, of course, two types of standards, positive and negative, definitions of what a food should contain, and limits of adventitous ingredients of a harmful or suspected harmful nature. I add the last phrase because there are still those who maintain that the addition of boric acid to cream in the proportion required as a mild preservative was in no way harmful. I will take the second class first. A moment's consideration will show that the presence of undesirable substances may arise in two ways, either by being present naturally in the raw foodstuff or by being picked up during the course of preparation or manufacture. Foodstuffs may contain substances which are regarded as poisonous, *e.g.*, shell fish may contain amounts of arsenic which far exceed the amounts permissible under the recommendations of the Royal Commission; barium is a natural constituent of Brazil nuts.

These considerations lead to an important point, namely, that limits set for poisonous or harmful ingredients must be specific to the foods themselves or classes of foods. With regard to the adventitious contamination, it must be remembered that there is not only the food manufacturer to control, but also the producer of the raw materials. In other words, the Ministry of Agriculture must combine for action with the Ministry of Health. The former may advocate a copper-arsenic spray for certain growing plants; spraying at the wrong time of the year, careless spraying or over-spraying may therefore result in the raw materials of the food manufacturer being contaminated when they come into his hands.

The Competent Authority

Admittedly, the competent authority may, in an arbitrary manner, set limits to the amount of a suspected harmful ingredient, but limits should be settled with due reference to physiological knowledge and also to the practicability of the standards. And it is not easy to get clear-cut ideas with regard to the physiological action of contaminating substances: as an example, there has been considerable discussion with regard to the possible ill-effect of aluminium. Here, and in the United States, in Germany and in France, the question has been discussed, and whilst the preponderance of data is to prove that aluminium is harmless in the amounts it is likely to be ingested by those eating foods cooked in aluminium containers, there are still a "die-hard" few who refuse to admit the conclusions of evidence to this effect.

Moreover, methods of analysis must be available to determine with a recognised degree of accuracy the presence of such contaminating substances. This may be thought to be a simple matter. In this connection it is not unimportant to note that a sub-committee of the Society of Public Analysts has been sitting for three years to evolve suitable methods whereby the metal content of food colours may be accurately determined.

This raises another point and one of extreme importance. Who is to define the method of analysis? In England there are three classes of people concerned with the question: State chemists (by which I mean the Government Chemist and his

staff and the chemical staff of the Ministry of Health), the public analysts, and the chemists employed by food manufacturing firms. I might also add the private consultants.

The first group, as representing the State, which will eventually be responsible for the promulgation of any laws dealing with food standards, might be expected to define the method of analysis. But they would have a colossal task in front of them and, as chemists as a whole are very democratic, they would probably prefer to get a consensus of opinion before methods were defined. The public analysts are, as a class, private individuals and any time they spend in the common-weal is actually paid for by themselves. Could the time and money which they have spent be evaluated, the country would be surprised at the public spirit of this group of chemists. Their knowledge of analysis makes them most important as collaborators in any work designed to develop methods. The third group is in a peculiarly fortunate position, and the way in which their employers have allowed them to co-operate in any schemes for the investigation of methods of analysis augurs well for the important influence which they would have in this matter: during the last two years these chemists have had a rallying ground in the Food Group of the Society of Chemical Industry. State chemists and public analysts have generally only second-hand information on which to judge the composition of a foodstuff, whereas from the first-hand information in their position, chemists in the industry itself have an advantage not always recognised.

Second-Hand Information

May I illustrate this? First a simple example—a chocolate cake. A standard might be set giving a minimum amount of cocoa solids necessary before it could be labelled or sold as "chocolate" cake. In the first place it is obvious that the standard must be so set that a chocolate cake can be made to contain the requisite amount of chocolate and yet be palatable. Assume this figure to be 10 per cent. The analyst confronted with the problem of developing a method of analysis which will yield definite results has a difficult task, owing to the extraordinarily complicated nature of the mixture, but the chemist in the food industry where chocolate cakes are being baked has the very definite advantage that he *knows* the amount of chocolate used and therefore the cocoa solids, and can refer his analysis to facts.

A second example. Certain publicity has been given to the lack of caffeine in coffee-chicory extracts. Chicory contains no caffeine, coffee a certain amount which is fairly standard, and therefore it has been argued that the amount of coffee used in the preparation of an extract is proportional to the amount of caffeine found in that extract. Such a deduction would be quite accurate but for one fact—that the caffeine extracted, and therefore found in the extract, may not reach, in certain methods of production, the theoretical amount, and consequently the amount of coffee used in the process of manufacture cannot be calculated from the caffeine content. Here, then, is another case where the pure analyst may go sadly astray.

Natural and Artificial Honey

There are certain classes of food products where the "taste" effect can be obtained without the use of the natural product whose name it bears. Such a product is "honey." Honey is, in effect, principally a mixture of two sugars which can simply be prepared artificially from cane sugar; the flavouring constituents are derived from the flowers from which the bee collected the nectar and to a certain extent are characteristic of the type of flowers worked by the bee. Now I do not know of any special dietetic attribute of natural honey which will not be provided by the carefully prepared artificial mixture, and yet I personally consider it wrong that the word "honey" should be attached to any foodstuff which does not contain the natural produce of the hive. Yet I know of no scientific test which could be applied to, say, honey-cake, which would prove conclusively which material had been used.

But even with the great advantage they possess I have known cases where it has been necessary to conduct hundreds of tests before it was possible to correlate the results of analyses with the known composition. Nevertheless, these examples prove the important collaboration which the food chemist can offer to his colleagues.

Many problems of analysis of food products demand fundamental knowledge which is not available at the present time. As I have said on another occasion, I consider that our research stations should devote more time to such problems and not apply themselves to "practical" problems These should be left to the chemists in industry who, with due deference to the workers in universities and research stations, are better fitted to the task. Such organisations as the Food Investigation Board of the Department of Scientific and Industrial Research have a great responsibility, and one would like to see public opinion influence them on the side of fundamentalism rather than towards the solving of commercial problems, but this wish takes for granted an educated public and not one which relies for its scientific ideas on the snappy headlines of the Press.

The Establishment of Standards

I am definitely in favour of the establishment of standards for products for which specific claims are made, such, for example, as foods for babies and children or for sick persons. I hesitate to quote as examples products reinforced by those bodies known as vitamins because of the difficulty of assaying them, but legislation is obviously wanted here. Bacteriological standards, too, should be formulated for certain classes of foods and, in any case, the presence of pathogenic organisms should be included in the groups of standards dealing with harmful ingredients. I would again stress the point that I am definitely adverse to the institution of any standards which cannot be verified by analysis or other scientific methods of testing.

There are classes of goods where control is more necessary than in others, but one can appreciate that the tendency would be to "go the whole hog" and to follow the example of other countries whose food regulations are most complete on paper but which, in some cases, are more honoured in the breach than in the observance. In fact, it may be said that paper regulations do not ensure pure food. To summarise my opinions, bureaucratic control tends to engender rules and regulations for the sake of rules and regulations; the general standard of purity of food in this country is very high; control by standards might conveniently be established for a restricted range of products; and verification of such standards must be by means of accepted methods of scientific examination.

Mysore Chemical Industries

Establishment of Permanent Factories

THE progress of chemical industries in Mysore was reviewed in a lecture at Bangalore by Dr. Gilbert Fowler, formerly of the Indian Institute of Science. In this progress the Indian Institute of Science assisted materially with research. Research which resulted in the establishment of permanent factories, was mainly concerned with the production of sandalwood oil, white lead, soaps, pencils and turpentine.

The sandal-wood oil factories in Mysore have been a great success, and the experience gained has led to a marked improvement in the general method of distilling Indian oils throughout South India. As regards white lead, before the war all supplies came from abroad, but thereafter the Indian Institute of Science was able to manufacture white lead from pig lead in India, and the factory then started has now developed to ten times its original capacity. The turpentine industry was fraught with difficulty in its initial stages, but after continuous experimentation it has been brought to fruition. Mysore also has factories producing high-class soaps.

The manufacture of incandescent gas mantles has also been successfully started, as the Institute was able to evolve a chemical process by which a type of mantle equal to the best foreign manufacture might be produced. Considerable work has also been done in connection with the lac industry. In the production of standard varnishes, involving the removal of wax and other non-resinous substances, several difficulties in the process of filtration had been overcome by adopting the method of filtering on a surface of the upturned fibres of a specially made coir mat. Much work has also been done on the production of various kinds of "plastics" from lac. Research on Mahua flowers has shown that a quite edible honey-like syrup could be obtained from them by adopting certain methods of purification.

New Use for Tetrahydronaphthalene

Clearing Gas Distribution Systems

IT is announced that Imperial Chemical Industries, Ltd., are shortly to put in operation a new process for the manufacture of tetrahydronaphthalene, which is to be marketed under the name of "Tetranap." The significance of this development lies in the fact that plentiful supplies of an exceptionally pure grade of the solvent are to be made available in this country at a low price, and a more general realisation of its importance to the gas industry should be the result.

Better known at "Tetralin" (registered trade name as manufactured in Germany and America), tetrahydronaphthalene is a water-white liquid of great stability, manufactured by the catalytic hydrogenation of pure naphthalene. Its use either in liquid form in scrubbers or in the form of vapour introduced into the actual gas stream, has for some time been well-established practice in Germany and America for the prevention and removal of naphthalene and gummy deposits in gas distribution systems. In both these countries the method is stated to have been developed with considerable success and to have cut down a notably heavy item in gas distribution costs.

Of all the volatile products in coke-oven gas, naphthalene is the most difficult to remove by the usual methods, and is notorious for its tendency to condense out in the solid form in the mains, and at any point where a temperature drop might be experienced. Added to this, conditions in the pipelines invariably favour the formation of sticky gum-like deposits (possibly arising from the polymerisation of traces of the higher unsaturated hydrocarbons carried along in the gas stream), and these impurities will in course of time build up on orifices and valves, eventually causing complete stoppage; whilst the large flaky crystals of deposited naphthalene are generally of sufficient size to block the small orifices of burners, needle valves and other parts of gas-burning equipment, and even to cause serious obstruction in the mains.

The problem is one which merits considerably more attention than has hitherto been given to it in this country. The use of solvents at a point or points in the distribution system suggests itself as the most logical and simple line of approach, and tetrahydronaphthalene has been fully proved to be the best solvent for the purpose. Its close chemical relationship to naphthalene makes it the most powerful solvent for that substance known to industry, and its volatility being low, comparatively small amounts are sufficient to saturate the gas.

Simultaneously with their announcement, Imperial Chemical Industries, Ltd., have published a booklet which should prove of much practical value, dealing concisely with the causes and effects of naphthalene chokes and gum deposits, and the methods by which "Tetranap" may be used to effect their prevention and removal. The properties of "Tetranap" are fully described, as well as all its possible applications in the gas industry, either as a liquid scrubbing medium, or in two alternative processes of "fogging" directly into the distribution system. The two processes of "hot" and "cold" fogging are discussed in useful detail and their relative merits outlined.

Whitewashing by Spraying

Versatility of Modern Spraying Machines

IMPORTANT developments have taken place recently in limewashing by means of sprayers. The Four Oaks Spraying Machine Co., of Sutton Coldfield, Birmingham, pioneers in spraying in this country, now manufacture sprayers for carrying out factory limewashing which have revolutionised this work, which was previously costly and slow, greatly hindering production. These machines are so moderate in cost as to be within the reach of even the smallest manufacturer. With a Four Oaks machine, 500 sq. ft. can be beautifully limewashed in 10 minutes without splashing or inconvenience, and as no scaffolding is necessary, the risk of accidents is reduced. One coat applied with a machine on rough, uneven walls or surfaces, is equal to two coats applied with a brush. Also, the material, being applied as a spray by a powerful pump, is driven into cracks and crevices where disease and insect pests breed, and where no brush could ever reach. With a machine a man can do as much in half an hour as in a day with a brush.

Another saving is made owing to scaffolding being unnecessary. It is possible with the aid of an extension lance to spray to a height of 25 ft. without any scaffolding. One large manufacturer who purchased a Four Oaks machine has written the manufacturers as follows: "Please supply us with two more spraying machines. Not only can they be used for limewashing, but they are excellent for purposes of disinfecting, and, as we have several large motors to deal with, including a large 40 h.p. fire engine, we find them most efficacious for washing the cars down—in fact, the number of uses to which they can be put are quite interesting, *viz.*, limewashing rooms, disinfecting buildings, washing motor-cars, washing windows, about four of the most necessary services such a machine could render, and with excellent results in every case."

In addition to spraying whitewash these machines efficiently spray creosote for preserving wooden buildings, and there are few trades where they are not of great use for many purposes. To enumerate a few we might mention the spraying of summer shading on to roof-lights in factories during hot sunny weather, for damping down and disinfecting in factories, for spraying cement into hot vertical gas retorts, for spraying ironwork, tubes, etc., with anti-corrosive solutions against rust, etc. There is no factory where one of these machines is not invaluable.

United States Chemical Notes

THE DU PONT CONCERN is to erect a medical research laboratory, to cost $100,000. Its purpose is to study the possible effect of the company's new chemical products upon the health of employees during steps of manufacture and to study all possible effects of the new products on public health before the products are marketed.

* * *

THE FIFTH PACKAGING EXPOSITION will be held at Chicago in March, 1935. This exposition will present equipment, machinery, materials, supplies and services involved in the chief phases of packaging, packing and shipping. An attendance upwards of 7,500 package users, business executives, merchandising experts and production men is anticipated.

* * *

THE GENERAL CHEMICAL CO.'S complaint against the Standard Phosphate and Acid Co., alleging infringement of Slama and Wolf U.S. Patent 1,371,004, for the oxidation of sulphur dioxide and the use of a catalyst in the manufacture of sulphuric acid, has been dismissed by the United States District Court sitting at Baltimore. Defendants filed a motion to dismiss bill of complaint on the ground that the patent was void because of unreasonable delay in filing a disclaimer as to claim 7, this claim having been held invalid as a result of previous litigation. Question whether this motion should be granted or overruled was the sole issue before the court.

* * *

THE MATHIESON ALKALI WORKS, which is being constructed at Lake Charles at a cost of $7,000,000 is progressing considerably ahead of scheduled time, despite the fact that it involves a number of new engineering developments. This plant will provide a new source of supply for soda ash, caustic soda and related heavy chemical products over a wide area in the south and south-west part of the United States. It will also permit economical shipment of alkali by water to points on the Atlantic and Pacific coasts. For nearly 40 years the Mathieson works at Saltville has been the only source of alkali in the south.

* * *

THE ATLANTIC FISHERIES' FISHING SEASON closed recently with an estimated catch for the period between June and October of 130,000 barrels of menhaden fish. The reported oil yield from the fish was between 5 to 6 gallons per barrel of fish. During the past few weeks fishing conditions have not been so good due to the advent of colder weather when the menhaden fish are driven from the coast where the steamers ply, though the smaller amount caught at this time of the year are said to be larger fish and richer in oils than those earlier in the season. The oil market for fish has been good in comparison with previous years.

Letters to the Editor

The Editor welcomes expressions of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

Chemists and the Poisons Act

SIR,—Unless they take protective measures chemists handling poisonous substances may, under the new proposed poisons regulations have their livelihood taken away and handed over to pharmacists and members of the Institute of Chemistry. The Institute has always been associated with the analytical or academic side rather than manufacturing. Shortly after the war the Institute was granting the associate degree to those who, due to the war, had been prevented from taking their examinations. A member of the committee stated that the writer was no longer a chemist eligible to become a member of the Institute as he was "now a manufacturer." Pharmacists of late have tended to become shopkeepers, but in any case it is rare that a pharmacist is called upon to manufacture in bulk.

Under the new regulations we seem to have the ironical position of analysts and shopkeepers being given the privilege of manufacturing chemicals, while chemical manufactures are not allowed to do so.—Yours faithfully,

Woodlesford, near Leeds. F. HULSE.

The Three Musketeers of Physical Chemistry

SIR,—I read with great interest and a good deal of amusement the article under the above sub-heading in your issue of October 27. Broadly speaking, the article is a mild protest against the almost entirely metaphysical speculations regarding the structure of the ultimate particles of matter, molecules and atoms, which to-day are given as full-blown theories, and the three heroes are an after-thought which really has little to do with the case. The path followed by the modern thinkers is a tribute to Kant, an admission of the infinite divisibility of matter, starting by dividing the so-called atom, and introducing further division when required. This in itself is not so objectionable, but why should the different classes of particles be identical in dimensions and mass? No such identities exist in the visible world, although they are thinkable, and the atoms of Dalton were such thinkable but improbable identities. Hence, considering the usefulness of the mere conception of atoms to chemistry, why not give the new spectro-radiological atom a chance as a permissible conception? It does no harm apart from wasting time for students, and laboratory practice will go on just as before, with an extra amount of jargon available for the benefit of "catalytic" reactions under high pressure among other things. The new resources of research need not be applied to "splitting the atom" and other means of gaining fame and prices only, they may help to do quite unexpected things of direct usefulness. Many of the new discoveries regarding isotopes, for instance, are undoubtedly of great interest and value, and the progress from a phenomenological point of view has been immense. If the X-ray worker is in the limelight to-day, so was the organic worker years ago, and maybe the "Berichte" contained as much rubbish in times gone by as the "Zeitschrift für Physikalische Chemie" has had to offer at a later date. So do "The Times" and "Whitaker's Almanack." Padding is the privilege of an editor, sometimes resorted to by authors when the spirit moves them. Bacon and Boyle are natural adjuncts to scientific padding, but why Faraday? In the foreshadowing business the Italians would no doubt make out a case for Galvani and Volta, and the French for Lavoisier.

If ultra-violet rays make gases conduct electricity, what matters whether the "ionised atoms" or "electrons," free, or attended by nursemaids, do the trick? Nobody is ever likely to see it done. The electron *per se* is, after all, only a name for Newton's light corpuscles—or anybody else's—wisely admitted to co-exist with undulations of what used to be called the luminiferous ether or undulations of an appendix to the electrons themselves. That the electron has a mate and children simply imparts a homely touch to the whole, and that we have high-frequency dances of electrons and progeny at one end to enhance the stately measure of the Sidereal dance at the other only completes the picture of universal bliss. My only regret is that there is too much monotonous uniformity at the small end. Unlike the author, I do not think that the mathematical physicist is inclined "to let all this be granted." He, no doubt, knows that the images are clumsy, but being trained to leave nothing to imagination, he works a clumsy proposition to the limit and turns to spiritualism. Still, there is truth behind it all, though the mysterious phenomena discovered by modern investigators speak in a different way to different observers, and one says the same as the other from fear of being thought ignorant if he did anything else. Perhaps the poet's vision of the Creator moulding star-dust of infinite fineness into a world of transcendent beauty by manipulations so intricate as to escape the power of understanding by the wisest of men for ever is the correct solution of the riddle. Still, let us praise without stint those who use all their faculties in an honest attempt to lift the veil, if ever so little!

Now, with regard to The Three Musketeers, I heard van't Hoff lecture once in my life. He was in Stockholm to receive his Nobel Prize and deliver his *quid pro quo* lecture. It was a gloomy day with snow-laden atmosphere, and the dingy lecture theatre at the Swedish Academy of Science was in semi-darkness, and one could hardly see van't Hoff who stood at the lecture table like a somewhat thin, medium-sized ghost. His lecture was a résumé mainly of the ins and outs of osmotic pressure, delivered in German in a hesitating manner and in an undertone, which was difficult to hear five yards off. Only once did he brighten up, when he mentioned that certain sterile solutions, isotonic with the protoplasm, had fructified the ova of some lower animals and brought forth embryos which unfortunately only lived for a short time. My sponsor, the late Prof. Mittag-Leffler, then fell asleep, but I struggled through awake till the end. Nobody even coughed. I am glad the author of your article found van't Hoff "a fascinating man to know." His importance to physical chemistry was strictly limited to osmotic pressure, but the value of his tetrahædron carbon atom notion to organic chemistry was immense, and remains so.

Svante Arrhenius was a different type of man. His main characteristic was pugnacity, and I regret with your author that his fighting spirit applied in a good cause was exhausted, when his memoirs on the electrical conductivity of electrolytes and the electrolytic theory of chemistry of 1883 and 1885* brought him fame. I saw him first at Upsala in '89 or '90, when he was there on a visit. He was then a vigorous, still young man with rather a poor opinion of Alma Mater Upsaliensis. I saw him for the last time at the Institution of Electrical Engineers a few years ago, so altered and feeble that I had a hard struggle to keep back my tears when he stuttered a few words in English in reply to an address of welcome. Shortly afterwards I was asked to write an obituary for "The Engineer," headed Svante Arrhenius. There is a melancholy query of what might have been in all this. He did a great deal more than give us the word dissociation to play with, he gave us a general theory of chemical equilibrium with electric charges as the universal driving force, flexible though lacking that precision which we are still looking for. Space prevents me from saying anything more. As another pupil of Cleve's, I must say that old Petter, as he was called, had plenty of imagination.

With regard to Ostwald, I know him only as a name and an author, and that he never gave us his second volume of his "Lehrbuch der Allgemsinen Chemie," which was to be a "Chemische Energielehre." Query: Who will? Finally, I will say that I can scarcely give these three their correct parts as The Three Musketeers.—Yours faithfully,

Ilford. JOHN RHODIN.

* The 1883 memoir was written in French.

Notes and Reports from the Societies

Society of Chemical Industry

Bristol Section : Jubilee Memorial Lecture

THE next meeting of the Bristol Section of the Society of Chemical Industry will be held on Thursday, December 6, at 7.30 p.m., in the University Chemical Department, Woodland Road, when Professor T. P. Hilditch, D.Sc., F.I.C., will lecture on " The Fats : New Lines in an Old Chapter of Organic Chemistry." Illustrations will be given of how the general build or composition of any fat can now be stated (at least, broadly, sometimes within narrow limits) by reference to its botanical or zoological origin. Some of the factors in glyceride structure and fatty acid composition which determine the suitability of particular fats for different uses will also be dealt with, as well as recent work on fish and other aquatic fats. Recent developments in fat-hydrogenation will be covered by this lecture, including (i) the glyceride structure of hydrogenated fats and (ii) the reduction of fatty acids to higher fatty alcohols. Modern work on the detergent, emulsifying and/or wetting value of (*a*) ordinary soaps and (*b*) " soapless detergents " which usually contain a long-chain alkyl group linked to a sulphate or sulphonate radical, are to be another feature which will receive the attention of the lecturer.

A joint meeting of the Bristol Section of the Society of Chemical Industry and the Bristol and South-Western Counties Section of the Institute of Chemistry, will be held on Monday, December 10, at 5.30 p.m., in the University Chemical Department, Woodland Road, when a lecture will be given by Dr. H. Levinstein on " Chemical Defence."

Liverpool Section : Photo-Electricity and the Chemical Industry

INTERESTING facts relating to the use of the photo-electric cell in the chemical industry were given by Mr. J. A. Walters in a paper read before the Liverpool Section of the Society of Chemical Industry on November 23.

The two main purposes of importance to the industry to which photo-electric cells could be applied, said Mr. Walters, were for control and measurement. Control work demanded a cell which had a high sensitivity, and one which could easily be coupled with amplifier circuits to obtain the necessary power for control. Cells to be used for measurement, on the other hand, had consistency or accuracy as a fundamental quality. There were three main types of cell, the conductivity or selenium cell (where light changes the electrical conductivity of the selenium), the alkali metal or emission cell (where light falling on sensitive surfaces causes an emission of electrons), and the rectifier cell. The first type was most sensitive and could be coupled to amplifiers, the rectifier cell came next, but had too low an internal resistance for easy amplification, whilst the vacuum emission cell had the lowest sensitivity, but was easily adaptable to amplification. So far as consistency and accuracy were concerned, the conductivity cell was quite out of the running, the vacuum emission cells were best in that respect, but the rectifier cells were a very good second, and were often employed for measurement on account of the simplicity of their associated circuits.

Commercial units were now available for control work and had been used successfully in many industrial problems. They consisted of a photocell and valve amplifier with a relay and were suitable for direct connection to mains. In measurement work it was, however, usual to use two cells and some bulb method whereby chance variations in batteries, light source, etc., were balanced out. With regard to the evaluation or measurement of colour, that, strictly speaking, was not possible with a simple photocell apparatus, since colours apparently identical to the eye might not be so to the cell, but within a narrow range of colours it was often possible to use a cell to decide whether or not two colours matched, although so far as the cell was concerned colour was only one of the many properties which went to make up the "match," and probably one of the least important.

The photo-electric method has its own advantages even in the simplest applications when the light beam is merely a substitute for a mechanical arm. A beam of light, for instance, takes up no room, and two beams can cross without let or hindrance unlike solid arms. No force is needed to interrupt the beam and it can pass through retaining walls of glass and can be bent along most tortuous paths by means of mirrors. For these reasons, among others, the commercial outfit has been used successfully for detecting holes in paper, reading water gauges in confined spaces and instruments in refrigerator rooms. It can also be used to indicate the presence or absence of black smoke in chimney stacks. Every case, however, must be considered on its merits before it is possible to say whether the photo-electric method is preferable to the other alternatives which are always present.

Liverpool Section : Hurter Memorial Lecture

THE Hurter Memorial Lecture will be delivered by Dr. J. T. Conroy, B.Sc., Ph.D., F.I.C., in the Chemistry Lecture Theatre, The University, Liverpool, on Friday, December 7, at 6 p.m. The subject will be " The Alkali and Associated Industries : A Retrospect."

London Section and Plastics Group

MEMBERS of the Plastics Group are invited to attend a meeting of the London Section of the Society of Chemical Industry at Burlington House, London, W.1, on Monday, December 3, at 8 p.m., when two papers will be read by Professor G. T. Morgan and his staff, entitled " Phenols from Low Temperature Tar " (Professor Morgan and Mr. A. E. J. Pettet), and " Formaldehyde Condensations with Polyhydric Phenols " (Mr. E. L. Holmes and Mr. B. A. Adams).

Newcastle Section : Presidential Address

MR. M. P. APPLEBY delivered his presidential address to the Newcastle section of the Society of Chemical Industry on November 23, his subject being "Sulphur."

The world consumption of sulphur in 1931, said Mr. Appleby, amounted to 7×10^6 tons, half going into sulphuric acid (9×10^6 tons), the rest to wood pulp, fungicides, CS_2, explosions and bleaches. In the United Kingdom in 1928, 91,000 tons of sulphur were imported, 5,000 from U.S.A. and 37,000 from Sicily. A further 150,000 tons was derived from pyrites and 85,000 tons from spent oxide. It was estimated that 2,168,000 tons were wasted in the recovery of Zn, Cu, Pb and Ni, nearly equal to the total production of Texas and Sicily combined. Canada and Scandinavia lost in this way 1,000,000 tons. Australia imported 80,000 tons which was cheaper than transporting the acid from metallurgical centres. The costs of transporting a ton of sulphur for a standard distance from Billingham were found to be, free £0.69, as SO_2 in cylinders £12.88, as SO_2 in tanks £5.24, as 95 per cent. H_2SO_4 £2.95, as 80 per cent. H_2SO_4 £3.5. It follows that it is by far the cheapest to transport sulphur as such.

A pilot plant with an output of 10 tons per day has been attached to the cement works at Billingham to work the process SO_2 + coke $\leftarrow$ CO_2 + S + 1,100° cal. For concentration of the gas a solution of alkali sulphite with a dissociating salt such as aluminium chloride has been developed which absorbs 6 per cent. of its weight of SO_2 from 6 per cent. gas with 98 per cent. efficiency. Pure SO_2 is given up on heating and moisture separated by cooling. Reduction is effected at 1,100° when the following reactions also occur, $CO_2 \rightarrow CO$, $CO + S \rightarrow COS$, $2H_2O + 2S \rightarrow 2H_2S + SO_2$. These undesirable products are caused to react with SO_2 in presence of a catalyst when

$$2CO + SO_2 \rightarrow 2CO_2 + S$$
$$2COS + SO_2 \rightarrow 2CO_2 + 3S$$
$$2H_2S + SO_2 \rightarrow 2H_2O + 3S$$

The constant for the reduction at 1,100° is $K = 1.6 \times 10^6$, $Q = 13{,}200$ cal. The working of such a process would make the burning of pyrites independent of the local market for sulphuric acid. The Orhla process, already used in Norway, causes loss of the iron, although 67,000 tons of sulphur were produced by it in 1933.

The world's coal consumption amounts to about 1,200 million tons annually and loses 12 million tons of sulphur, only about 200,000 tons being recovered. This problem is on another scale, however, as the lower limit of the present process is 3 per cent. SO_2 and the coal burning gives about 0.3 per cent.

Institute of Fuel

The Training of Boiler House Employees

AN informal meeting of the Institute of Fuel was held at Bush House, London, on November 22, when Mr. John Bruce, boiler house superintendent at the Barking Power Station, opened a discussion on the training of boiler house employees. He divided the staff of a modern boiler house into (1) boiler plant operators, (2) coal handling plant operators, (3) ash handling plant operators, and (4) repairs and maintenance staff. Personnel coming under (1) were again subdivided into (a) firemen or stokers, (b) assistant firemen, assistant stokers or trimmers, (c) milling plant operators, soot blowing operators, water tenders, fan attendants and pump attendants, and (d) cleaners and unskilled labourers.

Inasmuch as the duties of the so-called firemen or stokers are the most important of all the classes and consist in the maintenance of the demanded steam output at a certain pressure and temperature, and the control of the major proportion of the factors affecting efficient heat liberation and heat recuperation, Mr. Bruce expressed the view that the designation "fireman" or "stoker" is wrong and entirely out of keeping with the skill required in, and the responsibility attached to, the work of this grade of employee, and suggested that a more fitting and comprehensive description would be "boiler house operator."

No one with any experience of boiler house management would query the desirability and necessity for raising the standard of ability of boiler house employees engaged on plant operation. Even in the case of the highest grade of employee, such as firemen—or, as was suggested, boiler operator—only a percentage of this class could be considered up to the standard required on a modern plant. Any attempt at classifying the grades and types of individual engaged or entering upon boiler house plant operation, however, indicated that the problem of drafting a common course of technical and practical instruction was not so simple as at first sight it might appear. Actually, the problem divided itself into three parts: (a) raising the standard of ability of the employees at present engaged in the higher grades of boiler house work by means of definite technical instruction courses; (b) drafting a course for technical instruction for boiler house employees in the grades auxiliary to that of fireman or boiler operator to fit them for higher grade duties; and (c) drafting a course of technical instruction and practical training for young men taking up boiler house employment.

Dealing with (a), Mr. Bruce said it had to be admitted that under the present condition of things there are employees in the higher grades of boiler house work who are of low intellectual standard and who required almost constant supervision. Continuity of their employment was entirely due to the lack of trained operators and, when this was remedied, that type would find a level in the lower grades of boiler house employment. Such men would obviously benefit little or not from a training course. On the other hand, there might be among this class of employee a type of man who could readily understand the simple technical side of his work but whose practical knowledge was insufficient to decide his actions in the control of such work. At present, this workman found it difficult to obtain proper technical instruction. His choice was limited to certain evening classes at the technical schools, and these courses, with one or two exceptions, were not as suitable as they could be. Further, this type of man was engaged on shift duties and could not therefore attend the full number of classes in a session.

In the case of the larger plants the management might consider it an investment if they provided the means and the method whereby these men could be trained. This might take the form of classes which the men attended at the end of their day's work and at which instruction of the technical side of their work was given by one or more of the members of the senior engineering staff. To ensure attendance it was necessary that the men should be paid for the time occupied at the classes.

Again, assuming that the management would undertake the training of these men, it might be possible to adopt a scheme involving the employment of a full-time instructor who took in hand two men at a time for coaching over a period which would depend upon the capabilities of the pupils. This training would consist of sandwiching actual operation under the continual supervision of the instructor with technical tuition in a room set apart for the purpose, but everything would depend upon the selection of the type of instructor.

Considering the group of men engaged on operation work auxiliary to that of the fireman or boiler operator, Mr. Bruce pointed out that it is usually from this group that men are promoted when vacancies occur in the higher grade, and at present these men had the same difficulty in obtaining technical instruction as the men already discussed, and perhaps something on the same lines as that indicated for the fireman or boiler operator might be adopted. At the same time, the question was put whether the senior grades of boiler house labour ought still to be recruited from the same sources as in the past or has the time come when an effort should be made to attract a higher type of individual into this class of employment. To train men in the lower grades for promotion to the higher grades would necessitate radical alterations to existing practice. If the higher grades were to be recognised as a skilled trade, then a definite course of training must be specified to fit an individual for this type of work.

North-Western Section : Assessment of Gas-Making Results

A JOINT meeting of the North-Western Section of the Institute of Fuel and the Manchester District Association of Gas Engineers was held at the Engineers' Club, Manchester, on November 21, under the chairmanship of Major Vivian F. Gloag, when a paper entitled "A Method of Assessment of Gas-Making Results" was read by Dr. S. Pexton, of the Gas Light and Coke Co.

The gas-making results from different types of carbonising plant, using Durham run-of-mine coal (8 per cent. ash plus moisture), were reviewed by Dr. Pexton in the light of an index termed the "hydrocarbon enrichment value." This index may be evaluated from the following equation, which is applicable both to steamed and unsteamed retorts:—

$$E = \frac{V}{100{,}000}\left[H - 318\left(1 - \frac{N}{100}\right)\right]$$

where E = hydrocarbon enrichment value (therms), V = volume of the purified gas (cu. ft. per ton coal), H = calorific value of the purified gas (B.Th.U. per cu. ft.), N = percentage inerts (*i.e.*, $CO_2 + O_2 + N_2$) in purified gas. In the absence of coal-gas leakage out of the retorts, the value of E is an index of the cracking conditions within the retort. An increase in the value of E, with no change in the conditions of leakage, means an approach to the optimum conditions of cracking.

Recent results given in respect of intermittent carbonisation, that is, horizontal retorts, intermittent vertical retorts and coke ovens, show values of E ranging between 35 and 37.5. Similar results for continuous vertical retorts are lower at 32 to 35. The lowest tar yield of any in the large-scale tests was obtained from a vertical retort installation, which also gave the lowest value of E. Variations in the quantities of coal and gas oil used and of net coke produced per unit of gas sold were shown on a chart based on "hydrocarbon enrichment values." The necessary adjustments in respect of benzole recovery were also indicated.

Leather Trades Chemists

Symposium on Technical Aspects of Emulsions

ARRANGEMENTS have now been completed in connection with the Symposium on "Technical Aspects of Emulsions," organised by the British Section of the International Society of Leather Trades Chemists, and to be held at University College, London, on December 7, under the chairmanship of Professor F. G. Donnan, F.R.S. This symposium, which will start at 10 a.m., has attracted considerable attention in chemical, industrial and medical circles, and an exceptionally large attendance is assured. Those desiring to attend would greatly assist by intimating their intention to Dr. C. H. Spiers, at the offices of the Society, 17 Market Street, London, S.E.1.

The symposium is to be followed by a dinner which will be held at Maison Lyons, Shaftesbury Avenue, at 7.30 p.m., the guests of honour being Professor F. G. Donnan, F.R.S., Professor H. Freundlich, and Mr. E. Hatschek.

Chemical Engineering Group

Chemical Properties of Wood

THE next meeting of the Chemical Engineering Group will be held on Friday, December 14, at 8 p.m., in the Rooms of the Chemical Society, Burlington House, London, W.1, when a paper on "The Chemical Aspect of Timber Research" will be read by Mr. W. G. Campbell, B.Sc. This paper will deal with the chemical properties of wood and the factors governing its selection for various uses and its durability. The author will also enlarge upon the preservation of wood against organic decay and chemical decomposition. Mr. Campbell is the officer in charge of the Section of Wood Chemistry at the Forest Products Research Laboratory. The chair will be taken by Dr. W. R. Ormandy.

Low Temperature Carbonisation

THE chemical engineering aspect of low temperature carbonisation was the subject of a paper which Colonel W. A. Bristow read at a meeting of the Chemical Engineering Group, held in London on November 23. He gave a description of the plants which have been erected by his company, Low Temperature Carbonisation, Ltd., at Barugh, and Askern, and also at the works of the South Metropolitan Gas Co., Greenwich. The first was erected in 1927, the second in 1929 and has been considerably added to since, whilst the plant at Greenwich was erected in 1931.

In these three works there are a total of 628 retorts with a capacity for dealing with 370,000 tons of coal per annum. The works are in continuous operation day and night and every detail is so arranged that ordinary cleaning operations and such minor repairs as are necessary can be conducted without interfering with the production. The total amount of coal carbonised since the end of 1927 now amounts to nearly 1,500,000 tons, and in addition to the one million tons of smokeless fuel produced there has been made, fractionated, distilled, refined and distributed 150,000 tons of coal oil and coal petrol. In addition to the three works now operating, two more are to be built immediately, thus raising the throughput capacity to approximately 2,000 tons per day.

After dealing with some of the operating difficulties which have been experienced and demonstrating how what might appear to be a simple process, *viz.*, the carbonisation of fuel and drawing off the by-products, is, in fact, an extremely complicated matter, the author dealt with the cost of operation and the yields of products. The average yield of products from one ton of good washed bituminous smalls was said to be approximately as follows:

Smokeless fuel	14 cwt.
Crude coal oil	18 gal.
Crude petrol	3 gal.
Gas	30 therms.
Ammonium sulphate	4 lb.
Liquor	20 gal.

Although it was possible to increase the yields of oil, petrol and gas, the combustibility of the coke would then be injuriously affected owing to the reduction of its volatile content below the minimum required for high radiant efficiency. The liquor has hitherto been regarded as a noxious nuisance and involving in some cases fairly heavy expenditure. Recent research work, however, had shown that good ammonium chloride can be recovered from it in paying quantities and that synthetic resins can also be produced by a very simple reaction. This product, said Colonel Bristow, is most interesting and already a number of moulded articles had been made. The sulphate of ammonia recovered has a high nitrogen content and is taken by the farmers in the counties in which the works are situated. The price obtained is higher than that paid for the usual article.

Work has been proceeding for the past year on the development of a suitable Diesel oil fraction from the crude oil. The usual high anti-knock properties of coal oil constitute, however, a disadvantage from a Diesel standpoint, as they raise the spontaneous ignition temperature to a point that militates against easy starting.

Among other figures given in the paper it was stated that the calorific value of the smokeless fuel might be as high as 14,500 B.Th.U. per lb. It was further stated that a distribution system for home fuel oils has been established in Yorkshire and oil is being delivered direct from the works by road and rail tankers to a number of industrial plants in the area. Special reference in this connection was made to the glass and metallurgical industries. The oil is sold at a competitive price. All the oil can be hydrogenated and Imperial Chemical Industries and the Fuel Research Station have already converted many trial lots. The rate of throughput is high, being about 50 per cent. above that obtainable with high temperature creosote; in addition, the amount of hydrogen required is less, thus further reducing the cost. The gas produced in the process is generally utilised for heating the retorts and for subsidiary purposes on the plant. It can also be used for enriching town gas.

University Chemical Societies

Birmingham: Organic Compounds of Thallium

ORGANIC compounds of thallium were described by Mr. R. C. Menzies, of the Department of Chemistry, Bristol University, in a lecture delivered to the University of Birmingham Chemical Society, on November 19. The lecturer pointed out that the great differences between the compounds of mono- and tri-valent thallium and the close resemblances between the former and those of the alkali metals was no isolated phenomenon, but was closely paralleled by the differences between di- and tetra-valent lead compounds and by the resemblances between the compounds of di-valent lead and those of the alkaline earths. It remained, however, true that thallium was the only heavy metal which formed stable mono-valent compounds. These were well-known, many of the thallous salts of organic acids having been described seventy years ago by Kuhlmann, who prepared them from the acids and thallous carbonate ("Bull. Soc. Chim.," 1864 (2), *1*, 333).

The habitual use of aqueous thallous hydroxide as a reagent led to the preparation of compounds in which thallium replaces hydrogen in hydroxy compounds such as glycerol, erythritol, methyl glucoside, methyl arabinoside, sucrose and salicin, those of glycerol and erythritol being very slowly formed and very sparingly soluble. Owing to the insolubility of thallous iodide, many of these compounds gave, on treatment with methyl iodide, methylated derivatives and thallous iodide. It was pointed out that while this method of methylation is of interest, the more usually employed methods are so efficient that there is no need of another. This double decomposition between thallous derivatives and alkyl iodides had proved to be a particular case of similar double decompositions with organo-metallic halides.

From thallous acetyl acetone and dimethyl thallium iodide, dimethyl thallium acetyl acetone was readily prepared, the first of a number of similar compounds including diethyl gold acetyl acetone (Gibson and Simonsen, "Journ. Chem. Soc.," 1930, 2531) and trimethyl platinum acetyl acetone, the latter being volatile on heating, the vapour being decomposed on the hot surface of the glass with formation of a coherent platinum mirror which conducted an electric current. Attempts to prepare mercury methyl acetyl acetone and triethyl lead acetyl acetone in a similar way were unsuccessful, and theoretical considerations were submitted to explain this difference in behaviour.

The British Association

Meeting to be Held at Norwich in 1935

THE annual general meeting of the British Association will be held next year at Norwich from September 4 to 11, under the presidency of Professor W. W. Watts, F.R.S.

The following sectional presidents have been appointed:—Section A (Mathematical and Physical Sciences), Dr. F. W. Aston, F.R.S.; B (Chemistry), Professor W. N. Haworth, F.R.S.; C (Geology), Professor G. Hickling; D (Zoology), Professor F. Balfour Browne; E (Geography), Professor F. Debenham; F (Economic Science and Statistics), Professor J. G. Smith; G (Engineering), Mr. J. S. Wilson; H (Anthropology), Dr. Cyril Fox; I (Physiology), Professor P. T. Herring; J (Psychology), Dr. Ll. Wynn Jones; K (Botany), Mr. F. T. Brooks, F.R.S.; L (Educational Science), Dr. A. W. Pickard-Cambridge; M (Agriculture), Dr. J. A. Venn.

News from the Allied Industries

Plastics

AN EXTRAORDINARY GENERAL MEETING of Erinoid, Ltd., is to be held on December 12, to consider resolutions that the articles be altered, and the capital be increased to £330,000 by the creation of 55,000 6 per cent. redeemable preference £1 shares, all the shares to be redeemed at par by January 1, 1960.

Non-Ferrous Metals

THE INTERNATIONAL TIN RESEARCH AND DEVELOPMENT COUNCIL announces that the world's apparent consumption of tin for the twelve months ended September, 1934, was 118,700 tons, as compared with 121,100 tons in the preceding twelve months. The amount of tin used in manufacture was 134,500 tons, an increase of 6.9 per cent. over the quantity used in the previous year.

Artificial Silk

THE BRANSTON ARTIFICIAL SILK CO. reports a loss of £50,290 for the year to April 30, 1934. This includes receiver's remuneration, legal fees, etc., and £35,357 loss on realisation and depreciation of investments. Last year there was a loss of £39,346, after allowing £30,000 for depreciation, and the total debit to date is now £569,709. An expert who was examined the mill reports that the plant is quite efficient, and he sees no reason why it should not be started as a unit. He says that there is every reason to anticipate that good quality silk would be produced from the start. The directors state that the present position does not favour refinancing of the company on acceptable terms, but so soon as conditions become more favourable steps will be taken to bring the mill into production.

Rubber

THE INTERNATIONAL RUBBER REGULATION COMMITTEE will meet on Tuesday, December 11, and not, as previously announced, on Tuesday, November 27.

Safety Glass

CONSIDERABLE progress has been made since the Lancegaye Safety Glass Co. carried through its reconstruction scheme in March last. The sales have continued to expand on a satisfactory basis, says a circular announcing an interim dividend of 2½ per cent. actual. Further research, reorganisation of the factory and plant, and improvements in the method of manufacture are now being carried out, and the board foreshadow considerable expansion of the company's operations.

China Clay

THE CHINA CLAY INDUSTRY has made a big leap in its advancing shipments for October month, which serves to show that the general recovery of our industrial trade and the regaining of some of our foreign markets is being reflected in the demand for china clay. The details of the October shipping are as follows:—Fowey: 53,261 tons of china clay; 2,322 tons of china stone; 2,363 tons of ball clay. Par: 5,731 tons of china clay; 122 tons of china stone. Charlestown: 5,301 tons of china clay; 864 tons of china stone. Penzance: 412 tons of china clay. Padstow: 332 tons of china clay. Looe: 299 tons of china clay. Plymouth: 39 tons of china clay. Newham: 15 tons of china clay. By rail to destination: 5,944 tons of china clay. These shipments make a total of 77,005 tons, made up as follows: 71,334 tons of china clay, 3,308 tons of china stone, 2,363 tons of china clay.

Continental Chemical Notes

Sweden

THE BOLIDEN MINING CO. has commenced preliminary work on exploitation of a new ore deposit in Northern Sweden, containing, in parts, 3 per cent. copper and zinc, and 0.3 kg. silver per ton.

Poland

THE MANUFACTURE OF TANNING EXTRACTS will be shortly started in Warsaw by the Warszawska Fabryka Ekstraktow Garbarskich.

THE MANUFACTURE OF ESSENTIAL OILS, synthetic fruit aromas and plant extracts, is to be carried on by a new company which has been registered at Posen under the style of the Wytwornia Ekstraktor T. Zak Co., capital 10,000 zloty.

Czecho-Slovakia

THE BOHEMIAN CARBONIC ACID AND OXYGEN CO. is enlarging the production capacity of its solid carbon dioxide works at Hlubocepy.

PRODUCTION OF URANIUM ore has been recommenced at the Schönficht (near Marienbad) works of the Heinrichs Mining Co. The uranite there produced is a raw material for uranium pigments and ferro-uranium.

Spain

THE SPANISH GOVERNMENT COMMISSION which recently examined the prospects of coal and shale liquefaction has now announced its recommendations. Concessions for producing liquid fuel will be granted by the State through the medium of the Petroleum Monopoly Company, but only to Spanish companies in the principal coal mining and shale areas. A maximum production of 200,000 tons heavy and light hydrocarbons (including by-products) has been fixed for the first stage of the programme, but this figure will be revised at a later date.

Roumania

A CONCESSION FOR ERECTING A GLUE FACTORY has been granted to the Dermata Leather and Shoe Factory, of Klausenburg, following failure of negotiations between this firm and the cartel of glue factories relating to disposal of their waste leather. According to a press report production has already commenced in the new factory.

Denmark

THE COPENHAGEN GASWORKS are being equipped with benzole recovery installations.

IN ITS REPORT FOR 1933-34, the A/S Dansk Svovlsyre-og Superphosphat-Fabrik announces a further expansion of production which enabled 80 per cent. of the capacity to be utilised. Dividends of 10 per cent. are distributed on both the preference and ordinary shares.

Germany

RUHRCHEMIE A.G., in which are merged the nitrogen interests of the Ruhr mining industry, has issued its report for the year ending June 30 last and announces a gross surplus (in round figures) of 7½ million marks (as compared with 9 million marks for the previous year) and a profit of 1.5 million marks (against 0.9 million). This latter striking improvement is attributed to improved home demand, the export sales diminishing by 4 per cent.

THE I. G. FARBENINDUSTRIE A.G., in their progress report for the third quarter of 1934, state that trade continued to develop favourably notwithstanding increasing export difficulties. The dyestuffs section continues satisfactory with exports on about the same level as during the previous corresponding period. General chemicals, nitrogenous fertilisers, technical nitrogen and pharmaceuticals were all in good demand, but the last-named continued to encounter difficulties in the export market and suffered from increasing American and Japanese competition.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THERE are no changes to report in the general prices of heavy chemicals, rubber chemicals, wood distillation products, coal tar products, pharmaceutical and photographic chemicals and intermediates, but there have been a number of reductions in essential oils. Industrial chemicals have been in satisfactory demand. A reduction of one halfpenny per pound in the price of phenol will take effect in 1935. Unless otherwise stated the prices quoted below are for fair quantities net and naked at sellers' works.

LONDON.—There is a considerable improvement in the general inquiries for chemicals and quite a fair amount of business has been booked. Prices remain firm and steady. The coal tar products market remain firm and prices are unchanged from last week.

MANCHESTER.—Fairly steady deliveries of the principal lines of chemicals into consumption continue to be reported on this market, without, however, any material expansion in the demand for the textile dyeing and finishing trades, either in Lancashire or the West Riding of Yorkshire. A moderate volume of small-scale buying is being experienced, and a number of contracts over the early part of next year have again been placed, the alkali products and some of the potash compounds, among other sections, being the subject of attention. The tendency of the market as a whole remains steady and actual movements during the past week have been both few and not of very great importance. Reports from the by-products market just now are not too satisfactory, mainly owing to the easy tendency as a result of the heavier production, with buyers of most classes operating mainly on a strictly early delivery basis.

SCOTLAND.—Business in the Scottish heavy chemical market continues mostly on contracts for the year 1935.

Price Changes

Essential Oils.—BERGAMOT, 5s. 9d. per lb.; BOURBON GERANIUM, 20s.; CITRONELLA, Java 1s. 6d., Ceylon 1s. 4½d.; LAVENDER, Mont Blanc, 38/40%, 28s. 6d.; LEMONGRASS, AS. 10d.; ORANGE, sweet, 6s. 6d.; OTTO OF ROSE, Bulgarian, 42s. 6d. per oz.; SANDELWOOD, English, 22s. 6d. per lb.

All other prices remain unchanged.

General Chemicals

ACETONE.—LONDON. £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80%, £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—Commercial granulated, £25 10s. per ton; crystal, £26 10s.; powdered, £27 10s.; extra finely powdered, £29 10s. packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—10½d. per lb. less 5%. MANCHESTER: 10½d.

ACID, CRESYLIC.—97/99%, 1s. 8d. to 1s. 9d. per gal.; 98/100%, 2s. to 2s. 2d.

ACID, FORMIC.—LONDON: £40 to £45 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works. full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £54 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE. SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £34 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £21 to £22, ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton. SCOTLAND: £10 10s.

BARYTES.—£6 10s. to £8 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.

CADMIUM SULPHIDE.—2s. 5d. to 2s. 9d.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3⅞d. to 5d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. per lb.; liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £4 2s. 6d. per cwt. SCOTLAND: £4 2s. less 2½ per cent.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £25 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resumblimed B.P., 6s. 3d. to 8s. 4d. per lb.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34; brown, £32.

LEAD, NITRATE.—£27 10s. per ton.

LEAD, RED.—SCOTLAND: £24 to £26 per ton less 2½%; d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £36 10s.

LITHOPONE.—30%, £17 to £17 10s. per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

METHYLATED SPIRIT.—61 O.P. Industrial, 1s. 6d. to 2s. 1d. per gal. Pyridinised industrial, 1s. 8d. to 2s. 3d. Mineralised, 2s. 7d. to 3s. 1d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—8½d. to 8¾d. per lb. without engagement.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £38.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P., 5s. 2d. per lb.

POTASSIUM NIRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: B.P., 10d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 8¾d. per lb. SCOTLAND: Yellow spot, 8½d. ex store. MANCHESTER: Yellow, 8½d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 15s. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. net for spot lots and 4d. per lb. with discounts for contract quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.

SODIUM BISULPHITE POWDER.—60/62%, £18 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 10s. per ton.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £15.

SODIUM META SILICATE.—£16 per ton, d/d U.K. in cwt. bags.

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM NITRITE.—LONDON. Spot, £18 to £20 per ton d/d station in drums.

SODIUM PERBORATE.—LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5¼d. per lb. SCOTLAND: 5s. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¼d.

SULPHUR.—£9 15s. to £10 per ton. SCOTLAND: £8 to £9.

SODIUM SILICATE.—140° Tw. Spot £8 per ton. SCOTLAND: £8 10s.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER. £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 2s. 6d.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £14 5s. per ton f.o.b.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 3s. 11d. to 4s. 1d. per lb.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.

ZINC SULPHIDE.—11d. to 1s. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 8½d. to 8¾d. per lb.; crude, 60's, to 2s. 2½d. per gal. MANCHESTER: Crystals, 7½d. per lb.; crude, 1s. 11d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale 98%, 1s. 6d. to 1s. 7d.; according to specification. LONDON: 98/100%, 1s. 4d.; dark, 95/97%, 1s. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.

BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6¼d.

CREOSOTE.—B.S.I. Specification standard, 4d. to 4½d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3½d. f.o.r. North; 4d. London. MANCHESTER: 3½d. to 4¼d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4¼d.; heavy, 4¼d. to 4½d.

NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 7d.; 99%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160% 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—Purified crystals, £10 per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.

PITCH.—LONDON: 50s. per ton f.o.b. East Coast port.

PYRIDINE.—90/140, 7s. to 8s. 6d: per gal.; 90/180, 2s. 3d.

TOLUOL.—90%, 1s. 10d. to 1s. 11d. per gal.; pure, 2s. 2d. to 2s. 3d.

XYLOL.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 1d. to 2s. 2d.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 8d. per lb.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.

BENZIDINE BASE.—Spot, 2s. 5d. per lb., 100% d/d buyer's works.

BENZIDINE HCL.—2s. 5d. per lb.

p CRESOL 34-5° C.—2s. per lb. in ton lots.

m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.

DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 01½d.

DINITROCHLORBENZENE, SOLID.—£72 per ton.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags.

α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works.

o-NITRANILINE.—3ss. 11d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb., d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb.; 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

o-TOLUIDINE.—9½d. to 11d. per lb.

p-TOLUIDINE.—1s. 11d. per lb.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Dec., £7 0s. 6d.; Jan., 1935, £7 2s.; Feb., £7 3s. 6d.; Mar./June, £7 5s.; for neutral quality basis 20.6% nitrogen delivered in 6-ton lots to farmer's nearest station.

CYANAMIDE.—Dec., £7; Jan., 1935, £7 1s. 3d.; Feb., £7 2s. 6d.; Mar., £7 3s. 9d.; Apr./June, £7 5s.; delivered in 4-ton lots to farmer's nearest station.

NITRATE OF SODA.—£7 12s. 6d. per ton for delivery to June, 1935, in 6-ton lots, carriage paid to farmer's nearest station for material basis 15.5% or 16% nitrogen.

NITRO-CHALK.—£7 5s. per ton to June, 1935, in 6-ton lots carriage paid to farmer's nearest station for material basis 15.5% nitrogen.

CONCENTRATED COMPLETE FERTILISERS.—£10 5s. to £10 17s. 6d. per ton according to percentage of constituents, for delivery up to June, 1935, in 6-ton lots carriage paid to farmer's nearest station.

NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton, for delivery up to June, 1935, in 6-ton lots carriage paid to farmer's nearest station.

Latest Oil Prices

LONDON, Nov. 28.—LINSEED OIL was very firm. Spot, £20 5s. (small quantities 30s. extra); Dec., £18 15s.; Jan.-April, £19; May-Aug., £19 10s.; Sept.-Dec., £20, naked. SOYA BEAN OIL was firm. Oriental (bulk), Nov.-Dec. shipment, £15 per ton. RAPE OIL was steady. Crude, extracted, £27 10s.; technical refined, £29, naked, ex wharf. COTTON OIL was firmer. Egyptian crude, £18; refined common edible, £22 5s.; deodorised, £23 15s., naked, ex mill (small lots 30s. extra). TURPENTINE was quiet. American, spot, 44s. per cwt.

HULL.—LINSEED OIL.—Spot was quoted at £19 7s. 6d. per ton; Nov.-Dec., £18 17s. 6d.; Jan.-April, £19 5s.; May-Aug., £19 10s.; Sept.-Dec., £20, naked. COTTON OIL.—Egyptian, crude, spot, £18 10s.; edible, refined, spot, £20 10s.; technical, spot, £20 10s.; deodorised, £22 10s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £14 10s., naked. GROUNDNUT OIL. Extracted, spot, £23 10s.; deodorised, £27 10s. RAPE OIL.—Extracted, spot, £26 10s.; refined, £28. SOYA OIL.—Extracted, spot, £17; deodorised, £20 per ton. COD OIL (industrial), 25s. per cwt. CASTOR OIL.—Pharmaceutical, 36s. 6d.; first, 31s. 6d.; second, 28s. 6d. per cwt. TURPENTINE.—American, spot, 46s. per cwt.

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Complete Specifications Open to Public Inspection

1-CHLOR-2-METHYL-ANTHRAQUINONE, production.—I. G. Farbenindustrie. May 16, 1933. 29312/33.

COATING ZINC OR CADMIUM base metals, method.—New Jersey Zinc Co. May 13, 1933. 2879/34.

ALKENES AND DERIVATIVES thereof, manufacture.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. May 15, 1933. 12977/34.

PRODUCING OXYGEN of high purity, process and apparatus.—Linde Air Products Co. May 18, 1933. 13537/34.

KRYPTON AND XENON, process for obtaining.—Ges. für Linde's Eismaschinen A.-G. May 13, 1933. 13802/34.

PURE HYDRATOPECTIN, manufacture.—S. G. Rabate, A. Mace and J. Clement. May 13, 1933. 14059/34.

PETROLEUM OILS, chemical treatment.—Sharples Speciality Co. May 15, 1933. 14311/34.

ALDEHYDES OF THE INDOLE SERIES, manufacture.—I. G. Farbenindustrie. May 13, 1933. 14563/34.

AMINES, manufacture and production.—I. G. Farbenindustrie. May 18, 1933. 14632/34.

TITANATES from titanium ores rich in iron, manufacture.—Dr. A. Wacker Ges. für Elektro-Chemische Industrie Ges. May 15, 1933. 14657/34.

CARBOCYANINE DYESTUFFS, manufacture.—I. G. Farbenindustrie. May 16, 1933. 14797/34.

ACID DYESTUFFS, manufacture.—I. G. Farbenindustrie. May 17, 1933. 14798/34.

ALKYLATED CYCLIC AMIDINES, manufacture.—Soc. of Chemical Industry in Basle. May 18, 1933. 14799/34.

SULPHURISED DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. May 17, 1933. 14918/34.

CONDENSATION PRODUCTS of the formaldehyde-urea type, manufacture.—Dr. W. Kraus. May 18, 1933. 14920/34.

CADMIUM PIGMENTS, production.—G. Siegle and Co., Ges. May 17, 1933. 14960/34.

o-AMINOAZODYESTUFFS, manufacture.—I. G. Farbenindustrie. May 18, 1933. 15056/34.

UNSYMMETRICAL HEPTACARBOCYANINE DYESTUFFS and intermediate products therefor, manufacture.—I. G. Farbenindustrie. May 18, 1933. 15068/34.

SILVER-HALIDE EMULSIONS, sensitising photographic.—I. G. Farbenindustrie. May 18, 1933. 15069/34.

MORPHOLINE DERIVATIVES, manufacture.—E. I. du Pont de Nemours and Co. May 18, 1933. 15086/34.

Specifications Accepted with Dates of Application

RECOVERING ORGANIC COMPOUNDS from the waste products of the sulphuric acid refining of mineral oil or max, method.—V. Mehner and S. Rostler. May 11, 1933. 419,372.

CONTINUOUS DISTILLATION and rectification of musts containing acetone, ethyl alcohol, and butyl alcohol, apparatus.—Soc. des Etablissements Barbet. Dec. 1, 1932. 419,170.

HYDROGEN PEROXIDE, process and apparatus for the production. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler and Dr. L. Hess. Feb. 22, 1934. 419,245.

CELLULOSE DERIATIVES, production or treatment.—C. F. Boehringer und Soehne Ges. Feb. 25, 1933. 419,190.

GLUCOSE SYRUP, preparation of a dry product.—Deutsche Staerke-Verkau-Fogenossenschaft Eingetragene Gen. July 7, 1933. 419,248.

TITANIUM COMPOUNDS, preparation and use.—H. Spence, S. F. W. Crundall and P. Spence and Sons, Ltd. Feb. 7, 1933. 419,522.

AZO DYESTUFFS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). April 13, 1933. 419,447.

ALKALINE EARTH AND OTHER METALS from drosses and other metal-bearing substances and the preparation of alkaline earth metal alloys, recovery.—G. N. Kirsebom and Calloy, Ltd. May 10, 1933. 419,665.

AZO DYESTUFFS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). May 10, 1933. 419,599.

VAT DYESTUFFS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). May 10, 1933. 419,666.

SOLID CHLORINATED RUBBER PRODUCTS, manufacture.—J. P. Baxter and Imperial Chemical Industries, Ltd. May 10, 1933. 419,728.

KAURI GUM RESIN, process for minimising the colour content.—N. L. Wright (E. Marsden). May 10, 1933. 419,667.

REMEDY CONTAINING AN EMANATION, process for manufacturing.—G. T. Erhard and G. M. P. Schaefer. May 12, 1933. (Convention date not granted.) 419,528.

AZO DYESTUFFS, manufacture.—E. I. du Pont de Nemours and Co., I. Gubelmann and J. B. Oesch. May 12, 1933. 419,670.

ACRIDINIUM SERIES, manufacture of compounds.—I. G. Farbenindustrie. May 23, 1932. 419,603.

SYNTHETIC RESINS.—E. I. du Pont de Nemours and Co. May 13, 1932. 419,604.

ESTERS, production.—J. W. C. Crawford and Imperial Chemical Industries, Ltd. May 13, 1933. 419,457.

WATER-SOLUBLE DERIVATIVES of amino-arylarsenostibio compounds, manufacture of neutral.—I. G. Farbendustrie. May 14, 1932. 419,458.

WATER-SOLUBLE ORGANO-METALLIC COMPOUNDS, manufacture of neutral.—I. G. Farbenindustrie. May 14, 1932. 419,607.

CONVERSION PRODUCTS OF CASEIN, manufacture.—I. G. Farbenindustrie. May 17, 1932. 419,675.

AZO DYESTUFFS, manufacture.—E. I. du Pont de Nemours and Co. May 17, 1932. 419,736.

WATER-SOLUBLE COMPLEX COMPOUNDS of trivalent antimony, manufacture of neutral.—I. G. Farbenindustrie. May 19, 1932. 419,742.

OIL VARNISHES, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). May 19, 1933. 419,611.

BLEACHING FIBROUS CELLULOSE MATERIAL, methods.—A. H. Stevens (International Paper Co.). June 12, 1933. 419,543.

CELLULOSE ESTERS, manufacture.—Kodak, Ltd. (Eastman Kodak Co.). April 18, 1933. 419,763.

RECOVERY OF SULPHUR from hydrogen sulphide.—Girdler Corporation. Oct. 15, 1932. 419,479.

Applications for Patents

(November 15 to 21 inclusive).

SEPARATION OF SOLIDS AND LIQUIDS.—Birtley Co., Ltd. (Henry) 33410.

DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 32925.

ZINC SULPHIDE PIGMENTS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 33084.

WATER-INSOLUBLE AZO DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 33146.

PYRENE COMPOUND, manufacture.—A. Carpmael (I. G. Farbenindustrie). 33207.

HYDROGENATION OF RUBBER.—C. M. Cawley and J. G. King. 33506.

ACID ANHYDRIDES, production.—Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. (Germany, Nov. 17, '33.) 33243.

VULCANISING RUBBER.—Dunlop Rubber Co., Ltd. 33019.

HETEROCYCLIC CARBOXYLIC ACIDS, etc., manufacture.—E. I. du Pont de Nemours and Co. (United States, Nov. 15, '33.) 32949. (United States, Jan. 29.) 32950.

CASTOR OIL, etc., derivatives.—E. I. du Pont de Nemours and Co. 33534.

FORMIC ACID, production.—E. W. Fawcett, R. O. Gibson and Imperial Chemical Industries, Ltd. 33290.

DYEING LEATHER.—J. R. Geigy. (Germany, Nov. 18, '33.) 33202, 33246.

AQUEOUS BITUMEN EMULSIONS, stabilising.—J. R. Geigy. (Germany, Nov. 20, '33.) 33375.

VAT DYESTUFFS, manufacture.—W. W. Groves and I. G. Farbenindustrie. 33252.

CYANINE DYES, ETC., manufacture.—W. W. Groves (I. G. Farbenindustrie). 32935.

STEREOISOMERIC ALCOHOLS, manufacture.—W. W. Groves (Soc. of Chemical Industry in Basle). 33484.

BENZANTHRONE DERIVATIVES, manufacture.—I. M. Heilbron, Imperial Chemical Industries, Ltd., and F. Irving. 33403.

WATER-INSOLUBLE CONDENSATION PRODUCTS, manufacture.—I. G. Farbenindustrie. (Germany, Nov. 18, '33.) 33083.

ANTHRAQUINONE VAT DYESTUFFS, manufacture.—Imperial Chemical Industries, Ltd., F. Irving and C. Shaw. 33402.

DISTILLATION OF POWDERED MATERIAL.—Magnesium Products, Inc. (United States, Jan. 8.) 33311.

CONCENTRATING ORGANIC CARBOXYLIC ACIDS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, Nov. 21, '33.) 33520.

CONCENTRATION OF DEUTERIUM OXIDE IN WATER.—K. Nonhebel, G. Ogden and D. Tyrer. 33145.

DERIVATIVES OF CYCLIC β-KETOCARBOXYCLIC ACIDS, manufacture.—Schering-Kahlbaum. (Germany, Nov. 18, '33.) 33271.

From Week to Week

THE TELEPHONE NUMBER of Charles Clifford and Son, Ltd., Birmingham, is now Midland 2152 (with private branch exchange).

A VOLUNTARY WINDING-UP RESOLUTION was passed at a meeting of Commercial Solvents, Ltd., on November 15. Mr. J. Mathie, of Abbey House, Baker Street, N.W.1, has been appointed liquidator.

THE RECENT ISSUE OF £160,000 4½ per cent. debenture stock, 1944-46, offered to the holders of 6 per cent. 10-year convertible debenture stock and the preference and ordinary shareholders of the Neuchatel Asphalte Co., Ltd., has been oversubscribed.

NOTICE WAS GIVEN in the "London Gazette" of November 23 of the voluntary winding-up of Minerals Separation and Powell Duffryn Coal Treatment and Briquetting Co., Ltd., and the appointment of Mr. H. C. Hankins, of 62 London Wall, as liquidator.

NOTICE WAS GIVEN in the "London Gazette" of November 27 that the receiving order against Mr. E. M. de Greef, of Thames House, E.C.4, chairman of R. W. Greef and Co., Ltd., and a director of Scrubb and Co., Ltd., has been discharged. The Court has approved a scheme for payment in full of all preferential debts and also a composition of 6s. 6d. in the £ to all proved unsecured creditors.

THREE MEN WERE HURT IN A VIOLENT EXPLOSION at the Dowlais Iron and Steel Works this week. The men, who are employed by the British (Guest, Keen, Baldwin) Iron and Steel Co., Ltd., as furnacemen, were taping a blast-furnace when molten metal was hurled through the air in all directions. The men were seriously injured about the face and were detained in Cardiff Infirmary.

GOODS ENTERING PALESTINE and not fulfilling the law in regard to registration will shortly be liable to forfeiture. The existing legislation relating to trade marks and patents is shortly to be enforced, and all goods entering Palestine and marked "Registered," "Registered Trade Mark," "Patent," "Patented," and the like (even if in a foreign language) are liable to forfeiture at the port, unless they are the subject of a corresponding registration in Palestine.

PLANS FOR THE CONSTRUCTION OF AN OIL-FROM-COAL PLANT at Cardiff were announced at the annual meeting of the South Wales Industrial Development Council at Cardiff, on November 26. Mr. W. B. Mitford said the plant, which would be completed in three months' time, would utilise 75,000 tons of coal per annum. It was proposed to install similar plants in various ports of the country rather than erect one big plant on one site. The Cardiff plant would provide employment for about 300 colliers, but only fifteen men would be required to work the actual plant.

NEGOTIATIONS ARE UNDERSTOOD TO BE IN PROGRESS between Motor Fuel Proprietary and Vane Tempest Colliery at Seaham Harbour (owned by Lord Londonderry), for the erection by Motor Fuel Proprietary of the projected plant on a site close to the colliery. The completed plant, the erection of which is estimated to take approximately nine months, is expected to treat about 200,000 tons of coal per annum. The report of the company, issued on November 6, referred to the erection and operation of a new plant by Mr. H. P. Stephenson, and the abandonment of the use of the "Dvorkovitz" patents.

THE NITRATE CORPORATION OF CHILE, LTD., of Stone House, Bishopsgate, has issued a circular concerning the plans for dealing with certain old debentures under the new Chilean nitrate scheme. This new scheme provided for exchange, *inter alia*, of the certificates corresponding to the 4,097,904 series "B" preferred shares, and 87,052 ordinary shares of the same series in relation to the contributions of the companies (except the Lautaro and Anglo-Chilean concerns), which constituted Cia de Salitre de Chile, for a similar number of shares in the new Cia Salitrera de Tarapacá y Antofagasta. It is further understood that a balance-sheet of the successor company may be issued towards the end of the year.

THE TREASURY, on the recommendation of the Import Duties Advisory Committee, has issued the Import Duties (Exemptions) (No. 16) Order, 1934 (S.R. & O. 1934 No. 1275), adding to the free list a number of groups of organic intermediate products used by dyers in the production of dyestuffs on the fibre. In all, 122 items are thus exempted from duty. The committee refers to the recommendation embodied in its dyestuffs report of last year that all synthetic organic dyestuffs should be added to the free list and to its expressed intention to consider the question of the similar treatment of certain intermediate products which, though technically not dyestuffs, were used as dyestuffs and were subject to the same régime of import regulation. The list of articles now exempted from duty was prepared by the joint consultative committee representing all the industries concerned, and thus meets with the approval of both the consuming and the manufacturing interests. A white paper, containing the Treasury order and the recommendation of the committee to which it gives effect, is published by the Stationery Office (Cmd. 4747).

MOORE CARBONISING CO., LTD., is to be wound up voluntarily, in accordance with a resolution passed at a meeting on November 16.

A PETITION for the winding up of T. and R. W. Bower (Illingworth) Carbonisation Co., Ltd., will be heard at the Law Courts on December 3.

THE TWENTY-EIGHTH BEDSON LECTURE will be delivered by Dr. W. H. Mills, Sc.D., F.R.S., Reader in Stereochemistry, University of Cambridge, in the Chemistry Lecture Theatre of Armstrong College, at 6.30 p.m. on Friday, December 7. The subject will be "Some Stereochemical Questions."

IMPERIAL CHEMICAL INDUSTRIES, LTD., announces that, on behalf of its associated company, Mouldrite, Ltd., it has applied for and been granted a licence to manufacture aminoplastic materials under patents owned and controlled by the British Cyanides Co., Ltd., and their associates in Great Britain and in Europe.

BARROWFIELD OIL WORKS, Glasgow, formerly owned by John Murray and Sons, Ltd., have been taken over by Sadler and Co. (Glasgow), Ltd., the soap and oil firm of Dalmarnock. The new premises, which cover an acre and a half, will be used as an extension, rendered necessary by expanding trade.

POLLUTION OF THE RIVER TEES through cyanides, thought to be coming from some coke oven plant, was referred to at a meeting of the Tees Fishery Board held at Darlington, on Novempber 28. Dr. William Baigent, who presided, said that the Standing Committee had received a report that samples of water taken from the river during a flood tide near the Cleveland shipyard had shown cyanides present in lethal doses. Dr. Baigent said that some new coke ovens had been erected down the Cargo Fleet beck and the cyanides probably came from there.

WILLIAM DIXON, LTD., Govan Ironworks (Dixon's Blazes), Glasgow, have started operations on the installation of a coke-oven battery plant. The plant will come into use in a year from now. A £150,000 contract carries with it a guarantee that the new plant must be in working order within twelve months. William Dixon, Ltd., will utilise part of the gas obtained as a by-product from the new plant to fuel their blast furnaces, and hope to sell the remainder to the Glasgow Corporation. A surplus of 3,000,000 cubic feet a day will be available for sale to the municipal gas department if suitable terms can be arranged.

Books Received

German-English Chemical Terminology. An introduction to Chemistry in English and German. By Alexander King and Dr. Hans Fromherz. London: Thomas Murby and Co. Pp. 324. 12s. 6d.

Official Publications

Rubber: Its Anti-Oxidants and Preservatives. Compiled by the Science Library and the Research Association of British Rubber Manufacturers. London: Science Museum, South Kensington, London. Pp. 82. 5s.

New Companies Registered

British Magnesium (Elektrometall) Co., Ltd., Deveraux Chambers, Temple, London, W.C.2.—Private company. Registered November 12. Nominal capital £40,000. To produce, acquire or deal in magnesium in all its forms, compounds and alloys containing magnesium, all metals, minerals and substances used in or in connection with such compounds or alloys and other metals and minerals of every description; to carry on the business of metal founders, steel makers, refiners and rollers, blast furnace proprietors, electricians, metallurgists, chemical manufacturers and metallic residue and by-product dealers, etc.

Fisons' Fertilizers (Western), Ltd., 5 Gipeswyk Avenue, Ipswich. —Registered as a "private" company on November 15. Nominal capital £100. Manufacturers of and dealers in fertilisers of every description, and chemicals and substances required in connection with the manufacture thereof, manufacturers of and dealers in sulphate of ammonia and super-phosphates, ammonia fixed or dissolved and guano, phosphate grinders, seed crushers and oil refiners, importers of and dealers in oil cake, Peruvian and other guanos, nitrate of soda, shipowners, etc. Directors: F. G. C. Fison, L. B. Robinson and J. G. F. Fison.

Metallurgical Treatment Syndicate, Ltd., 10 Atholl Crescent, Edinburgh, 3.—Registered in Edinburgh November 13. Nominal capital £5,000. To acquire any patents, brevets d'invention, licences, concessions and the like, or any interests therein, in the United Kingdom, and elsewhere, etc. Directors: Archibald Crawford, Herbert T. Davies, Herbert L. Warden.

Company News

J. C. and J. Field.—The payment of a dividend on the 7 per cent. preference shares is announced for the half-year ended September 30, 1934, payable on December 10.

Lancegaye Safety Glass (1934).—An interim dividend of 2½ per cent., less tax, in respect of the period ending March 31, 1935, is announced payable on December 3 next. This is stated to be the first dividend to be paid by the company, which is a reconstruction of Lancegaye Safety Glass, registered in 1928.

B. Laporte, Ltd.—It is announced that the directors have decided to initiate the policy of paying interim dividends. Payment is to be made of 5 per cent. for the half-year to September 30. For the year to March 31, 1934, the total dividend was 15 per cent. and capital bonus of 20 per cent. was paid from reserve.

Sulphide Corporation.—The directors have declared a dividend of 2½ per cent., less tax, on the preference shares, to be paid out of profits earned for the year ended June 30, 1934, payable on January 14. This is the first distribution since 1930, when 5 per cent. was paid. The last ordinary payment was 15 per cent., in 1929.

English China Clays.—The directors announce the payment of arrears of dividend on the 7 per cent. cumulative preference shares for the three months ended December 31, 1932. In March and again in July last allocations were made covering the arrears of interest in the first nine months of 1932, so that the whole 1932 preference interest will now have been paid off.

British Benzol and Coal Distillation.—The report for the twelve months to October 31, 1934, shows a trading profit of £16,179. After allowing for interest, tax, and £14,096 for depreciation, the loss for the year is £8,577, which, with the debit balance of £79,516 brought forward, makes a total debit balance of £88,093. The annual meeting will be held at 152 Leadenhall Street, London, E.C.3, on December 6, at 12 noon.

Splintex Safety Glass.—The net profit to June 30, was £976, as compared with a loss in the previous year of £24,974. The directors state the profit is the outcome of improved sales, together with economies in manufacture and administration; this reduces the debit to £46,576. The annual meeting will be held at the Institute of Chartered Accountants' Hall, London, E.C., on December 5, at 12 noon.

Anglo-Persian Oil Co., Ltd.—It was announced on Tuesday, that the board of directors had decided not to declare an interim dividend on the ordinary stock, but to defer consideration of a dividend until the accounts for the year 1934 are available. No interim dividend has been paid since 1930. For the years 1933 and 1932 the company paid 7½ per cent., less tax, each time on the ordinary stock.

Tate and Lyle, Ltd.—The report for the year to September 30 last states that the total profits are up from last year's figure of £1,032,334 to the new peak level of £1,304,687. The ordinary dividend is raised from 17 per cent. to 22½ per cent., while general reserve receives £150,000, against £50,000, and taxation equalisation reserve £150,000, £50,000 is written off plant and machinery, in comparison with £250,000 written off a year ago under the scheme of reconstruction of refineries.

British Cotton and Wool Dyers' Association.—The profit for the half-year to September 30, after deducting administration expenses and charging £4,412 for specific depreciation, and £23,528 for repairs and renewals, was £42,905; after allowing for interest £12,400, debenture holders' trustees £100, depreciation fund £12,500, and fees, etc., the net profit was £17,225, which, with £44,855 brought forward, makes a total of £62,080. The net profit for the corresponding period, 1933, was £21,393, and for the year to September 30, £59,945.

Rubber Regenerating Co.—For the nine months to September 30, 1934, the report shows that the net profit was £6,662, after providing for depreciation. For the previous twelve months, after provision was made for depreciation of £13,215, there was a loss of £1,925. After allowing for the dividend of £26,566 paid on August 31, 1934, writing £11,817 off patent applications and improvements, and £2,402 off extraordinary expenses and conversion of the company into a public company, and also £1,005 off construction at Trafford Park, £1,230 remains to be carried forward. It is announced that half-yearly accounts will be issued in future, and the next accounts will cover the period to March 31, 1935.

Unilever, Ltd., and Unilever N.V.—The boards have decided interim dividends on their respective ordinary capitals. In the case of the Unilever N.V., the dividend is Fl.20 per Fl.1,000 share, the same as a year ago. In accordance with the previous practice each £1 of stock of the English company has been taken as equal to Fl.12, so that the equivalent dividend on each £1 of stock is the sterling value of 24 Dutch cents per share. Converted at the present rate of exchange this is equal to 7.8d. per £1 of stock, or 3¼ per cent. Last year's Unilever dividend was equal to 7.2d. per share or 3 per cent., which was followed by a final of 3⅛ per cent., making 6⅛ per cent. compared with 8⅝ per cent. for the previous year.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Canada.—A newly-established manufacturers' agent at Toronto desires to secure the representation of United Kingdom manufacturers of compressors, hoists, manganese steel, also engineering equipment for mines, paper mills, and oil refineries, on a commission basis, for the Province of Ontario. (Ref. No. 471.)

Sweden.—An agent established at Stockholm wishes to obtain the representation of United Kingdom manufacturers of chemical preparations for fumigation, insecticides, equipment for manufacturing and handling chemicals. (Ref. No. 483.)

Brazil.—A commission agent established in Rio de Janeiro wishes to obtain the representation of United Kingdom manufacturers of drugs, chemical products, metals, aluminium, zinc, tools, and raw materials for industrial purposes. (Ref. No. 490.)

Voluntary Liquidation

Oil and Tallow Merchants' Affairs

THE statutory meeting of the creditors of R. Critchley, Ltd., oil and tallow merchants, Comus Street, Salford, was held recently at the Chartered Accountants' Hall, Manchester, when Mr. G. Critchley, chairman of the company, presided. A statement of affairs was submitted which showed ranking liabilities of £12,556 16s. 3d., of which £4,189 9s. was due to the trade; £2,508 to a loan creditor; and £5,859 7s. 3d. to a partly secured creditor. No value, however, was set on the security held by the latter. The assets consisted of cash in hand, £4 19s. 4d.; stock, £1,250; plant, machinery, fixtures and motor car £1,500; book debts, £2,228 6s. 9d., estimated to realise £1,400; amount owing by a former director, £137 16s. 2d.; and surplus from fully secured creditors, £189 12s. 6d., making a total of £4,482 8s., from which had to be deducted preferential claims of £478 9s. 10d., leaving net assets of £4,003 18s. 2d., or a deficiency, so far as the creditors were concerned, of £8,552 18s. 1d. The issued capital was £6,500 and the deficiency, as regarded the shareholders, was £15,052 18s. 1d.

It was stated that the cash creditor shown in the statement was the chairman and the partly secured creditors were the bankers. They held direct securities consisting of shares in a subsidiary company on which no value had been placed at the moment. They also hold certain collateral security. There were fully secured creditors for £4,060 7s. 6d., who held a mortgage on certain land and buildings at Comus Street, Salford. It was further stated that the company had carried on business successfully for some time. Dividends of 10 per cent. were paid on the ordinary shares up to about two years ago. Since that time the turnover had declined and a loss had been sustained on the trading.

Resolutions for the voluntary liquidation of the company had already been passed by the shareholders, with Mr. Norman Woolley, of Edwin Guthrie and Co., Manchester, as liquidator. The creditors confirmed the appointment of Mr. Woolley subject to Mr. A. R. Webb, of Webb and Hall, Deansgate, Manchester, being nominated as joint liquidator. A committee was also elected consisting of the chairman, Mr. T. A. Lever, and representatives of Gerrard and Sons, Ltd., Turnbull and Yates, and Imperial Chemical Industries, Ltd.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., patent and trade mark agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to December 14, 1934.

Solafix. 548,007. Class 1. Chemical substances for use as ingredients in textile printing compositions. British Dyestuffs Corporation, Ltd., Imperial Chemical House, Millbank, London, S.W.1. January 23, 1934.

Queries

Anti-Acid Fittings.—A subscriber wishes to get into touch with the makers of "Millard" and "Alcumite" anti-acid fittings. (C.A. Query No. 805.)

Forthcoming Events

LONDON.

Dec. 3.—Society of Chemical Industry (London Section). "Phenols from Low Temperature Tars." Professor G. T. Morgan, and A. E. J. Pettet. "Formaldehyde Condensations with Polyhydric Phenols." E. L. Holmes and B. A. Adams. 8 p.m. Burlington House, Piccadilly, London.

Dec. 4.—Royal Society of Arts. "Empire Production of Essential Oils for Perfumery." E. W. Bovill. 4.30 p.m. John Street, Adelphi, London.

Dec. 5.—Society of Public Analysts. 8 p.m. Burlington House, Piccadilly, London.

Dec. 5.—Institute of Metals (London Section). Joint meeting with the Institute of British Foundrymen. "Manganese Bronze." Wesley Lambert. 7.30 p.m. 83 Pall Mall, London.

Dec. 6.—The Chemical Society. Ordinary scientific meeting. 8 p.m. Burlington House, Piccadilly, London.

Dec. 7.—Institute of Chemistry. 17th Streatfeild Memorial Lecture. "Quinine Manufacture in India."

Dec. 7.—Royal Institution. "The Crystallisation of Alloys." Dr. C. H. Desch. 9 p.m. 21 Albemarle Street, London, W.1.

Dec. 7.—Society of Dyers and Colourists (London Section). "The Colorimetric Determination of *p*H Values." T. T. Cocking and S. K. Crews.

Dec. 7.—International Society of Leather Trades' Chemists. (British Section). Symposium on "Technical Aspects of Emulsions." 10 a.m. University College, Gower Street, London.

ABERDEEN.

Dec. 4.—Institute of Chemistry (Aberdeen and North of Scotland Section). "The Use of the Ultra-violet Lamp in Analytical Work." A. Hill. 5.15 p.m. Chemistry Department, Marischal College, Aberdeen.

BIRMINGHAM.

Dec. 3.—University of Birmingham Chemical Society. "Chemical Aspects of Pathology." Professor G. Haswell-Wilson. 5 p.m. Chemical Lecture Theatre, Edgbaston, Birmingham.

Dec. 6.—Institution of the Rubber Industry (Midland Section). "Fatty Acid Softeners and Rubber Compounding." T. L. Garner and Dr. C. M. Blow. James Watt Memorial Institute, Gt. Charles Street, Birmingham.

Dec. 7.—Institute of Brewing (Midland Counties Section). Annual dinner. Queen's Hotel, Birmingham.

BRISTOL.

Dec. 6.—Society of Chemical Industry (Bristol Section). Jubilee Memorial Lecture. "The Fats: New Lines in an Old Chapter of Organic Chemistry." Professor T. P. Hilditch. 7.30 p.m. University Chemical Department, Woodland Road, Bristol.

GLASGOW.

Dec. 7.—Ramsay Chemical Dinner. 7 p.m. Central Hotel, Glasgow.

LEICESTER.

Dec. 5.—Leicester Literary and Philosophical Society (Chemistry Section). "Manufacture of Town's Gas." F. W. Stevens. 7.30 p.m. College of Technology, Leicester.

LIVERPOOL.

Dec. 7.—Society of Chemical Industry (Liverpool Section). Hurter Memorial Lecture. "The Alkali and Associated Industries—a Retrospect." Dr. J. T. Conroy. 6 p.m. University, Liverpool.

MANCHESTER.

Dec. 6.—Institute of Chemistry (Manchester Section). Chairman's address. Annual dinner and dance. "The Manchester," Ltd., Manchester.

Dec. 7.—Oil and Colour Chemists' Association (Manchester Section). "Survey of the Mechanism of Polymerisation—An Academic Study." Dr. J. O. Cutter and Dr. L. A. Jordan. Reynolds Hall, College of Technology, Manchester.

MIDDLESBROUGH.

Dec. 3.—Iron and Steel Institute. Joint meeting with the Cleveland Institution of Engineers. Cleveland Technical Institute, Middlesbrough.

NEWCASTLE.

Dec. 7.—The Bedson Club. 28th Bedson Lecture. "Some Stereochemical Questions." W. H. Mills. 6.30 p.m. Armstrong College, Newcastle-on-Tyne.

NOTTINGHAM.

Dec. 6.—Society of Chemical Industry (Nottingham Section). "Ceramics and the Chemical Industry." G. N. Hodson. 7.30 p.m. University College, Nottingham.

PRESTON.

Dec. 3.—Institution of the Rubber Industry (Preston and District Section). "Service as a function of the Rubber Industry." H. C. Young. Victoria and Station Hotel, Preston.

SWANSEA.

Dec. 7.—Society of Chemical Industry (South Wales Section). "The Decay of Wood in relation to Coal Formation." Dr. E. A. Rudge. 7 p.m. Thomas' Cafe, High Street, Swansea.

TROWBRIDGE.

Dec. 5.—Institution of the Rubber Industry (West of England Section). "Fire Risks and their Prevention." D. W. Wood. Town Hall, Trowbridge.

WORKINGTON.

Dec. 7.—West Cumberland Society of Chemists and Engineers. "The Modern Trend of Research in Metallurgy." T. Swinden. 7 p.m. Workington.

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PATENTS obtained, trade marks and designs registered, at home and abroad.—GEE AND CO. (Patent and Trade Mark advisers to THE CHEMICAL AGE), 51-52 Chancery Lane, London. W.C.2. Telephone: Holborn 1525. Established 1905.

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THE proprietor of British Patent No. 356,645 is prepared to sell the patent or to licence British Manufacturers to work thereunder. It relates to the manufacture of Ammonia by the contact process. Address Boult Wade and Tennant, 112 Hatton Garden, London, E.C.1.